Appeal Brief
Appln. No. 10/775,697

IN THE BOARD OF U.S.PATENT APPEALS AND INTERFERENCES

Appeal Brief

Application No.	10/775,697
Appellant:	XIAODA XIAO
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Examiner:	P. Khatri
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INTERIOR BLIND SPOT MIRROR

Board of Appeals and Interferences
P.O. Box 1450
Alexandria, VA 22313-1450

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Real party in interest

Xiaoda (Richard) Xiao

135 Belchertown Road

Amherst, MA 01002

Tel: (413) 253-7456

(413) 253-0263

Related appeals and interferences **None**

Status of claims

Claims 12-26 (all the claims) are rejected

Status of amendment

Claim 26 has been amended to be in independent form including the recitation of claims 23-25. Entry of this amendment is proper. 37 CFR 41.33 (a) (2)

Summary of the claimed subject matter

An interior blind spot mirror which is mounted on the pillar of the window frame inside a vehicle on the driver's side completely eliminates the blind spot. The interior blind spot mirror includes an extension serving as a bridge between the mirror and the base which can be removed from the extension. There are two ball joints on either end of the extension which enable a user to conveniently adjust the mirror to a desired position. The base includes a soft pad sandwiched between the base and the double stick foam adhesive so that the base can fit pillars of different shapes. The interior blind spot mirror also includes an alternative base constructed of soft material such as polymer which can be mounted on all shapes of the window frames inside vehicles without the soft pad being attached to the bottom of the base. There is a mounting box on top of the base having a U-shaped notch for the ball joint box on the lower end of the extension to be slidably affixed onto the base. In use, a driver of a vehicle should first mount the base on the pillar of the window frame on his/her left side and wait for two hours in order to let the adhesive reach its ultimate strength before inserting the extension of the mirror into the U-shaped notch on the mounting base. The interior blind spot mirror can be mounted on the passenger's side as well as on the driver's side.

Grounds of rejection to be reviewed on appeal

Claims 12-14, 16-17 and 23-26 stand rejected as obvious over DeLine 6,450,193 in view of Stern 3,741,632 and further in view of Sharp 4,244,548.

Claims 15, 18, 19 and claims 20–21 are rejected in still further view of Bury et al. 3,928,894.

Claim 22 is rejected in still further view of Manzoni 4,558,840.

Argument

Appellant does not believe that the claims are obvious as, for a claim to be rendered obvious, the reasonable combination of prior art references must teach or suggest each recited feature of the claim.

On page 2 of the Office action (in the last 5 lines) it is acknowledged that DELINE does not disclose an exterior assemble adjustment, extending through the plastic mount and acting in cooperation with the frictional board for adjusting a tightness of the first ball joint against the plastic mount.

The Office Action acknowledges that DeLine does not teach " a frictional board with a centrally-located ball pit, the frictional board located inside the plastic mount intermediate the plastic mount and the mirror; and an exterior accessible adjustment, extending through the plastic mount and acting in cooperation with the frictional board for adjusting a tightness of the first ball joint against the plastic mount; and extending through the plastic mount and into the frictional board, the adjustment part providing user-adjustment of tightness of the first ball joint against the plastic mount." (Office action page 2, starts from line 8)

In this regard, see, e.g. Fig 3 B of appellant's application illustrating one embodiment that includes screws extending through the plastic mount and acting in cooperation with the frictional board for adjusting a tightness of the first ball joint against the plastic mount.

The Office Action declares that "Stern teaches of a mirror being one of shatterproof glass and a Plexiglas (see Stern Col. 2 Lines 62-63) . . ."

What Stern discloses in Col. 2 Line 62-63 is "An antiglare mirror according to claim 1, in which the prism surface carries a reflective metallic coating." This is about antiglare coating and not a mirror being one of shatterproof glass and a plexiglas.

Appellant agrees, however, that Stern's disclosure is a convex rearview mirror. (see Stern Col. 2 Line 43, claim1.) In this regard, "**When a prior art reference merely discloses the structure ~~of the claimed~~**

of the claimed compound, evidence showing that attempts to prepare that compound were unsuccessful before the date of invention will be adequate to show inoperability." *In re Wiggins*, 488 *F, 2d* 538, 179 USPQ 421 (CCPA 1971)

According to MPEP 2121.02 II, although Stern's convex rearview mirror discloses the structure of a convex plexiglas rearview mirror, evidence - *all the driving schools and road test for the driver license require a driver to be turn around to see if there is a passing vehicle hidden in the spot blind to the driver before driving the vehicle* - shows that its attempt to eliminate the blind spot is unsuccessful.

"Further," the Office Action declares, (page 3, line5) " Sharp teaches of a frictional board (see Sharp Fig 3 Numeral 50) with a centrally-located ball pit (34), the frictional board located inside the plastic mount intermediate the plastic mount . . ."

This figure is reproduced below:

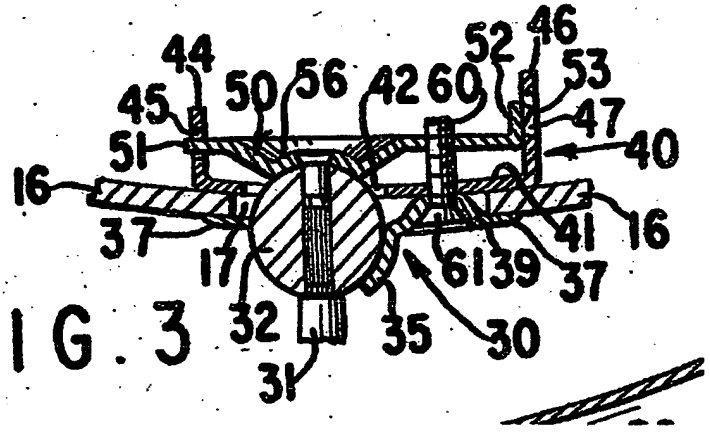

FIG. 3

The Office Action indicates there is disclosed, as part of the frictional board (pressure plate) 50, a centrally-located ball pit 34. Note that element 34 is the ball seat member 34 of the clamping assembly 30. See Sharp Fig 1-2 and Sharp Col.3, lines 15-20. Thus, element 30 does not meet this recitation of being part of frictional board 50.

In fact, the part of plate 50 best corresponding to the recited ball pit would be portion 56. But portion 56 is not centrally-located as recited. Further, the principal of operation of Sharp's disclosure is completely different from that of the appellant's invention.

Indeed, the teaching is to provide a pivoting assembly as per Col. 3, beginning at line 15: "a ball joint and clamping assembly 30 [that] comprises four principal parts in addition to the supporting ball member, namely: a ball seat member 34, a body clamping member 40, a ball clamping member 50 mounted on portions of member 40, and adjustable tensioning screw 60."

"The ball seat member 34 is a rigid piece formed with a spherically concave portion 35 to receive and cradle the outer side of the ball 32, and with substantially flat bordering portions 37 which bear and are fixed against the outer side of portions of the body wall at 16 that border the opening 17. The concave, ball cradling portion 35 has an opening 36 in its

base through which the ball stud 31 extends to the mirror base top 22. The opening 36 is made large enough to accommodate the required angular adjustability of the mirror head relative to the stud 31."

See the passage beginning at line 52: "The ball clamping member 50 in the illustrated embodiment is formed as a substantially rigid yet resilient pressure plate that extends and is supported between the upstanding legs 44 and 46 of the body clamping member 42. *One end of the plate 50 is engaged* ***pivotably*** *with leg 44, as by being formed with a tongue 51 fitting into a slot 45 formed in that leg. The opposite end of the plate 50 is engaged loosely with the other leg 46 of the body clamp member, so as to be displaceable relative to leg 46 in the direction toward the base portion 41, i.e. toward the ball 32 and the bordering body wall 16.* For this purpose the plate 50 may be formed with an upturned end 52 from which a lip 53 is stuck out to protrude laterally into a clearance opening 47 formed in leg 46. The lip 53 has a limited range of free motion in the clearance opening 47 to limit displacement of the pressure plate 50 in the direction away from the body wall at 16. End 52 of plate 50 can be forced down into assembled position."

Claim 12 is therefore non-obvious.

Sharp's mounting base is offered for the rejection of claim 13. The Office action remarks (last paragraph on page 2): "Regarding claim 13, DeLine in view of Stern and in further view of Sharp discloses a mounting base (see Sharp Fig. 1 Numeral 20) with a mounting surface (29) for

detachably mounting (see Sharp Col. 3 lines 8-14 the mounting base (20) to a surface (vehicle body), the extension arm (31) connecting the mounting base (20) to the plastic mount (10)

Sharp Col. 3 lines 8-14 reads: "The bracket 25 is first fastened onto the pad 29 and a vehicle body by engagement of the screw 27, and then the mirror base is placed over the bracket and is fastened to it by a screw 24 so that the base flange 23 presses the outer portion of the pad 29 against the surface to which the pad and the bracket are mounted.

Clearly, bracket 25 and pad 29 are two pieces fastened together by screw 27, and the mirror base is connected to the bracket by a screw 24. Stud 31 is referred to as the extension arm of Appellant's invention, (see Fig.3 A, Fig.8 B of Appellant's invention) but stud 31 "having the ball 32 fixed on its upper or free end." (Sharp Col. 2, lines 65-66) and does not connect bracket 25 and pad 29 to the mirror base. Rather, it is screw 24 that connects the mirror base to bracket 25. Compare to Sharp's stud 31, Appellant's extension arm 21 (Appellant's invention Fig.2) has two ball joints on either of the two end. And in review of MPEP 2121.02 II, Sharp's disclosure as prior art reference does not contain an "enabling disclosure" . . .

Thus, claim 13 is non-obvious.

In view of the disclosed SHARP structure, even if this SHARP structure were used in a mounting base, the mounting base of the appellant's invention would not result.

"Regarding claim 14," the Office Action recites, (Office Action page 4 line 3) "DeLine in view of Stern and in further view of Sharp discloses a ball joint box (see Deline Fig.11 Numeral 516b) secured to a mounting base (516) mounted within the joint box (516); and second ball joint (514b) located at second end of the extension arm (514), the second joint (514b) mounted within the joint box (516b) wherein, each end of the extension arm (514) provides a flexible adjustment point so that the mirror can be flexibly adjusted at either end of the extension arm (Col.13 Lines 3-8)

Appellant has reviewed that particular passage of DeLine's disclosure and finds it read like this: "Preferably, passageway 514b is flared outwardly at either end of facilitate movement of the mirror wiring as one or both ball members are pivoted within their respective sockets, thereby, substantially reducing the possibility of cutting or damaging the wiring as the mirror and or/arm 514 are pivoted relative to the mount 516."

See the reproduction of DeLine Fig.11 below:

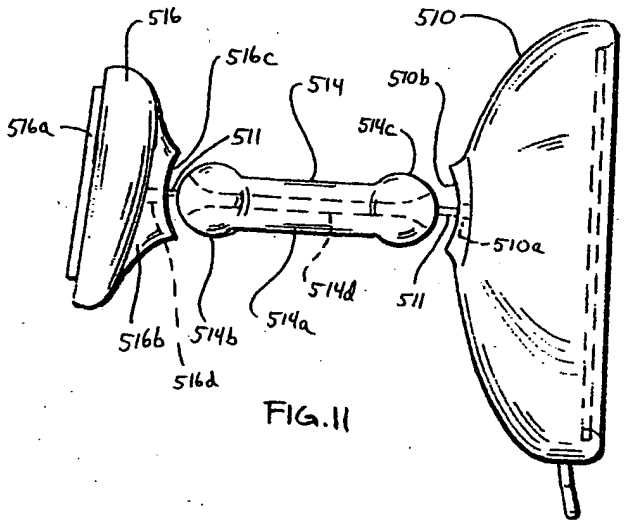

FIG.11

DeLine's arm (514) is a "double ball mounting arm, which comprises a central shaft portion 514a and a ball member 514b and 514c positioned at opposite ends of the shaft portion 514a. ***A passageway 514d*** *is provided through mounting arm 514, preferably through a center portion of ball member 514b and 514c and shaft portion 514a, for receiving and routing the mirror wire 511 through passageway 516d of mount 516 to a corresponding passageway 510a of interior rearview mirror 510."*

See Appellant's invention Fig.2, extension arm 21 and starts at the bottom line of page 10 ". . .extension 21 which has a curving upper part." DeLine's central shaft portion 514a is a straight arm. In addition, Appellant's mounting box 22 comprises 2 screw holes 40 and 41, through which the 2 screws 45 and 46 are used to adjust the tightness of the friction applied against the frictional board at the second ball joint and Fig. 3 B shows the plastic mount on the first ball joint, wherein, screw 43 and 44 are provided through two holes 47, 48 in back exterior 24, and 51, 52 in frictional board 56 to adjust the tightness of the friction applied against

ball pit 61, or the first ball joint. DeLine's disclosure does not have the above recited features. Furthermore, DeLine's rearview mirror is of a power adjustment which is of a different operational principal from that of Appellant's invention. And in review of MPEP 2121.02 II, the reference of DeLine does not contain an "enabling disclosure."

Thus Claim 14 is non-obvious.

"Regarding claims 16-17," the Office Action reads, "DeLine in view of Stern and in further view of Sharp discloses a pad (see DeLine Fig. 2, 16a with adhesive) of resilient material attached to a bottom of the pad, the double-stick foam allowing mounting the mounting base to a side pillar of a vehicle window frame" (Office action, page 4, lines 9-15)

This feature of Appellant's invention has not been considered at all.

The invention is an interior blind spot mirror which is mounted, e.g., on the driver's side, or on the passenger's side. In one embodiment, the base includes a soft pad sandwiched between the base and the double-stick foam adhesive so that the base can fit pillars of different shapes. The interior blind spot mirror also includes an alternative base constructed of soft material such as polymer which can be mounted on different shapes of pillars of the window frames without the soft pad being attached to the bottom of the base. (See Abstract and Fig. 4, Fig. 6 and Fig. 8 of Appellant's application.)

The rejection of claim 16 – 17 is found on Office Action page 4.

"DeLine in view of Stern and in further view of Sharp describes a pad (see DeLine Figure 2, 16a with adhesive) of resilient material attached to a bottom of the mounting base, the pad allowing mounting of the mounting base by fitting to different shaped vehicle pillars (Col. 4 line 48-51 and line 62-66,) and further a double-stick foam adhered to a bottom of the pad (see DeLine Figure 2, 16a with adhesive,) the double-stick foam allowing mounting of the mounting base to a side pillar of a vehicle window frame (Col. 4 lines 48-51 and lines 62-66.)

DeLine Figure 2 is reproduced below:

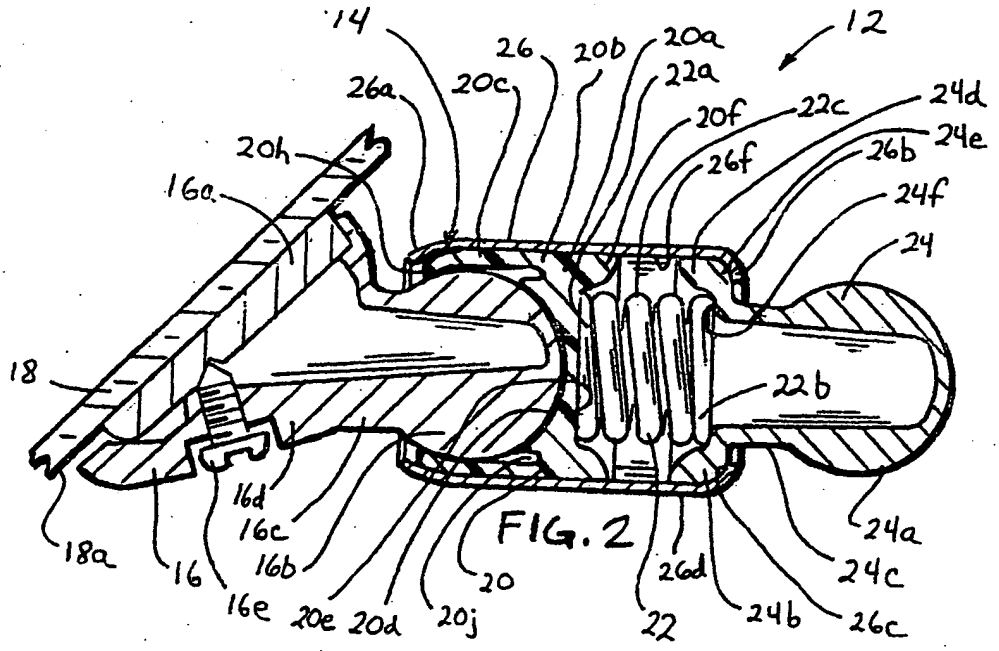

FIG. 2

Mounting base 16 of mounting assembly 12 is secured to a mounting plate 16a (commonly referred to in the art as a mirror mounting button), which is secured to interior surface 18a of the windshield 18. Mounting base 16a may be secured to the interior surface of the windshield , such as by an adhesive, or maybe secured to a headliner or console (not shown) at or adjacent to an upper edge of the windshield, without affecting the scope of the present invention." (Deline, Col. 4, line 58-66)

Appellant has reviewed these passages and finds no mention of element 16 being "a pad of resilient material attached to a bottom of the mounting base by fitting to different shaped vehicle pillars."

Rather, element 16 is referred to as a mounting base 16 and element 16a as a mounting plate, secured by adhesive to the windshield and not to a side window pillar.

Thus, the reference does not teach or suggest the features of claim 16 for which it was offered.

Claim 16 is non-obvious.

Similarly, appellant does not see the recited feature of "a double-stick foam adhered to a bottom of the pad, the double–stick foam allowing mounting the mounting base to a side pillar of a vehicle window frame."

Thus, the reference does not teach or suggest the features of claim 17 for which it was offered.

Claim 17 is also non-obvious.

Claim 23 has recitations that are slightly different but still require the frictional board include a centrally-located ball pit (with the frictional board located inside the plastic mount intermediate the plastic mount and the mirror). Thus claim 23 is also non-obvious.

Appellant does not see the claim 24-25 recitations of (the frictional board further comprises two planar surfaces extending along a longitudinal length of the mirror on two sides of the ball pit) the adjustment part comprises two screws for adjusting the friction applied against the first ball joint.

The Office Action indicates that two screws would be obvious, as a mere duplication of working parts, one screw on each side of the ball pit. This does not make sense as one side of the ball pit (left side with elements 44, 45 and 51) is a pivoting point. It is senseless to place an adjustment screw near the pivoting point.

Accordingly, claim 25 is non-obvious.

The recitations of claim 26 are believed non-obvious for the references do not teach or suggest at least "the frictional board with a centrally-located ball pit comprises a screw hole on each of two planar surfaces extending on the two sides of the ball pit, each screw hole securing one of the two screws, wherein, user-adjustment of the two screws adjusts the friction applied against the first ball joint."

The Office action reads (page 5, line 9)," Claims 15, 18, 19 and 20-21 are rejected under 35 U.S.C. 103 (a) as being unpatenable over DeLine in view of Stern and in further view of Sharp and in further view of Bury et al.

According to the Office action, "Bury et al. teaches of a mounting box (see Bury et al. Fig.1 Numeral 10) with a U-shaped top surface on the mounting base (20), the mounting box (10) slidably accepting the ball joint box (20) so that the ball joint box (20) is slidably affixed within the mounting base against the U-shaped top surface." (see Col. 2 lines 50-60)

Col. 2 lines 50-60 of Bury et al. reads: "a mounting system comprising a base plate or clip 10 adhered to a surface, such as a portion of a windshield 50, and adapted to slidably receive a mounting member 20. The clip 10 will preferably be preassembled, by an adhesive bond, to the windshield 50 to facilitate handling. The mounting member 20 may subsequently be slid over the clip in the direction of the arrow A and clamped thereon through the use of set-screw 28. A mirror assembly 30 is typically fixed or removably attached to the mounting member 20."

Below is the reproduction of Bury et al. Fig 1.

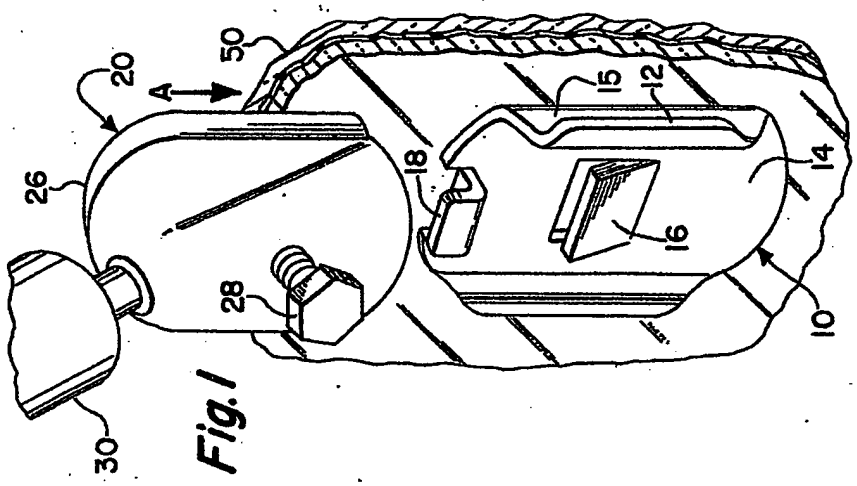

Fig. 1

Clearly Numeral 10 is not a "mounting base with a U-shaped top along the longitudinal length of the base," but a clip with outwardly flanged shoulders 12 over which a channel shaped base member 20 is slid and fixed through the use of set-screw 28.

It makes sense if numeral 10 of Bury et al. is described as an upstanding U-shaped top, but the mounting base of Appellant's invention is featured with a U-shaped top along the longitudinal length of the base with wedged-in edges along the major axis. (see Fig. 2. 23) With the different features recited above, the operational principles of the two are completely different, e.g., Bury's clip 10 is adhered to a portion of windshield while the mounting base of Appellant's invention is mounted on a side window pillar inside a vehicle, Bury's mirror assembly is mounted by sliding it **over** clip 10 while the mounting box of Appellant's invention is slidably affixed **within** the U-shaped top of the mounting base, mounting assembly 20 of Bury's disclosure is fixed to clip 10 through the use of a screw set 28 against lip portion 16, while mounting box 22 of Appellant's invention is simply slid into U-shaped mounting top 23 . In further review of MPEP 2121.02 II, Burt et al.'s reference does not contain an "enabling disclosure."

Thus claim 15 is non-obvious.

Similarly, claim 18 is non-obvious

Claim 19 is non-obvious for the same reason.

Claim 20-21 are rejected in further view of BURY, "DeLine in view of Stern and in further view of Sharp and in further view of Bury et al. discloses the claimed invention . . ." (Office Action page 7, line 1-13) No teaching of Bury et al. is offered as to the features recited by these claims. Thus, it appears that the combination of DeLine, Stern and Sharp, together with the mere duplication of working parts, forms the bases for this rejection.

But, as discussed above, there is no advantage or motivation for the use of four screws for adjusting the friction applied against the first and second ball joints, where the pivoting arrangement of Sharp is used.

Accordingly, claim 20 is non-obvious.

As to claim 21, the recitation compares to 26; "the frictional board with a centrally-located ball pit comprises a screw hole on each of two sides of the ball pit, each screw hole securing one of the four screws, the ball joint box comprises a frictional board with a centrally-located ball pit and a screw hole on each of two sides of the ball pit, the screw holes of the ball joint box frictional board each securing one of the four screws, ." This is a structure different and non-obvious over Sharp (alone or together with the other references). And in further review of MPEP 2121.02 II, all these prior art references do not contain an "enabling disclosure."

Thus claim 21 is also non-obvious

The office action indicates that claim 22 is rejected in further view of Manzoni (U.S. Patent No. 4,558,840). "Manzoni teaches the mirrors assembly mounting base with a mounting surface for mounting the mounting base on either of a driver side and a passenger side pillar of a vehicle front window frame (see Manzoni Fig 1, Col. 1 Lines 45 –46 and Col. 1 lines 65-Col. 2 line 5)."

Below is the reproduction of Monzini's Fig 1

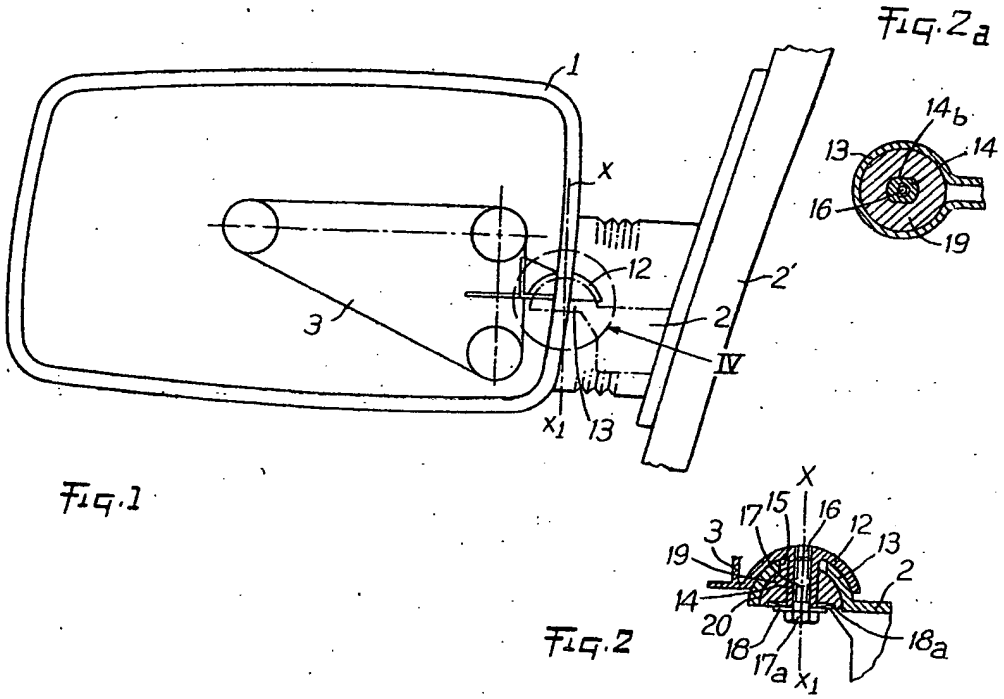

Fig.1

Fig.2

"Fig.1 shows a rearview mirror casing 1, made in this example of plastic material, which is mounted on a support member or base 2 by way of an intermediate member 3 which consists of a metal plate secured on the base of the case 1."

"The support member 2 is secured in a known manner to the vehicle body panel or gusset 2' of the car door adjacent the window."

It is unarguable that Manzoni's disclosure is related to the exterior side rearview mirror which is mounted "**on the gusset of the car door adjacent to the window**" and not on a window pillar inside a vehicle as claim 22 of Appellant's invention describes. Note that "a side pillar of a vehicle front window frame" is separated from the car door. In further review of MPEP 2121.02 II, the reference of Manzoni does not contain an "enabling disclosure."

Thus claim 22 is non-obvious.

All the claims are believed to be non-obvious. If there is anything that is obvious, it is surprisingly obvious that the examiner does not understand the features of Appellant's invention, nor does he understand that of the prior art references for the rejection of the claims, or he could not have taken those simple elements such as a shatterproof glass for a antiglare coating, a mounting plate adhered to a windshield (DeLine) for a soft mounting pad that fits different shapes of window pillars, clip10 (Bury Fig. 1) for a U-shaped top along the major axis of the mounting base (Fig. 2 of Appellant's invention), a gusset on the car door (Manzoni Fig. 1) for an inside window pillar of Appellant's invention, leave alone the complicated features such as the pivoting adjustment (Sharp) which the examiner takes for the symmetrical adjustment of Appellant's invention.

The Office action also convinces Appellant that the examiner does not have a driver's license, for if he does, he should have known the regulation of turning around to check the blind spot which the road test for a driver to be requires.

He probably also needs an ESL tutor, because Appellant respectfully notices that "In view of DeLine, in further view of Stern, and in further view of Sharp and in further view of Bury and in further view of Monzoni " and so forth, plus word for word duplication of Appellant's specification, and that of 37 CFR takes 7 pages and 10 lines of the 8- page Office action without a single word of his own except for, of course, a bunch of "howevers," "buts" and "ands."

I wish the Board disregard the above comments if it goes too far away from the subject matter. But I want to remind the examiner of 37 CFR (c) (2)

> "In rejecting claims for want of novelty or for obviousness, the examiner must recite the best reference at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be described as nearly as practicable pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified."

By the way, according to the publication of NHSA, the conventional rearview mirrors and the interior blind spot mirror of Appellant's invention are not of the same subject matter, (see the copy of the letter from NHSA.)

Xiaoda (Richard) Xiao

Claims appendix

12. (previously presented) An interior blind spot mirror, comprising:

a mirror having one of a rectangular and an oval shape,

the mirror being one of a shatterproof glass and a plexiglas,

the mirror finished with an antiglare coating,

the mirror being one of a convex surface and a flat surface;

a plastic mount supporting the mirror,

the plastic mount having a curving back exterior surface and a mounting hole in a center of the back;

an extension arm comprising a first ball joint located at a first end of the extension arm,

the first ball joint mounted in the mounting hole of the plastic mount;

a frictional board with a centrally-located ball pit,

the frictional board located inside the plastic mount intermediate the plastic mount and the mirror; and

an exterior accessible adjustment, extending through the plastic mount and acting in cooperation with the frictional board for adjusting a tightness of the first ball joint against the plastic mount.

13. (previously presented) The mirror of claim 12, further comprising:

a mounting base with a mounting surface for detachably mounting the mounting base to a surface,

the extension arm connecting the mounting base to the plastic mount.

14. (previously presented) The mirror of claim 13, further comprising:

a ball joint box secured to the mounting base; and a second ball joint located at a second end of the extension arm,

the second ball joint mounted within the ball joint box, wherein,

each end of the extension arm provides a flexible adjustment point that the mirror can be flexibly adjusted at either end of the extension arm.

15. (previously presented) The mirror pf claim 14, further comprising:

a mounting box with a U-shaped top surface within the mounting base,

the mounting base slidably accepting the ball joint box so that the ball joint box is slidably affixed within the mounting base against the U-shaped top surface.

16. (previously presented) the mirror of claim 14, further comprising:

a pad of resilient material attached to a bottom of the mounting base, the pad allowing mounting of the mounting base by fitting to different shaped vehicle pillars.

17. (previously presented) The mirror of claim 16, further comprising:

a double-stick foam adhered to the bottom of the pad, the double-stick foam allowing mounting the mounting base to a side pillar of a vehicle window frame.

18. (previously presented) The mirror of claim 14, wherein,

the mounting base comprises a central piece of a protuberant, rectangular shape and with wedged-in edges along a major axis, and ii) a U-shaped mounting box with wedged-in sides,

the mounting box slidably accepting the the ball joint box so that the ball joint box is slidably affixed within the mounting base against the U-shaped mounting box,

the ball joint box glued into the mounting box.

19. (previously presented) The mirror of claim 17, further comprising:

a mounting box comprising wedged-in edges on a major axis,

the mounting box provides a protuberant central piece of the mounting base,

20. (previously presented) The mirror of claim 14, further comprising:

four screws for adjusting the friction applied against the first and second ball joints.

21. (previously presented) The mirror of claim 20, wherein,

the frictional board with a centrally-located ball pit comprises a screw hole on each of two sides of the ball pit,

each screw hole securing one of the four screws,

the ball joint box comprises a frictional board with a centrally-located ball pit and a screw hole on each of two sides of the ball

pit, the screw holes of the ball joint box frictional board each securing one of the four screws, wherein,

user-adjustment of the screws adjusts the friction applied against the first and second ball joints.

22. (previously presented) The mirror of claim 12, further comprising:

a mounting base with a mounting surface for mounting the mounting base on either of a driver side and a passenger side pillar or, a vehicle front window frame,

the extension arm connecting the mounting base to the plastic mount.

23. (previously presented) An interior blind spot mirror, comprising:

a mirror having one of a rectangular and an oval shape,

the mirror being one of a shatterproof and a plexiglas,

the mirror being one of a convex surface and a flat surface;

a plastic mount supporting the mirror,

the plastic mount having a curving back exterior surface and a mounting hole in a center of the back;

an extension arm comprising a first ball joint located at a first end of the extension arm,

the first ball joint mounted in the mounting hole of the plastic mount;

the frictional board located inside the plastic mount intermediate the plastic mount and the mirror; and

an exterior accessible adjustment part, extending through the plastic mount and into the frictional board, the adjustment part providing user-adjustment of a tightness of the first ball joint against the plastic mount.

24. (previously presented) the mirror of claim 23, wherein the frictional board further comprises two planar surfaces extending along a longitudinal length of the mirror on two sides of the ball pit.

25. (previously presented) The mirror of claim 24, wherein,

the adjustment part comprises two screws for adjusting the frictions applied against the first ball joint.

26 (currently amended) An interior blind spot mirror, comprising:

a mirror having one of a rectangular and an oval shape, the mirror being one of a shatterproof glass and a plexiglas, the mirror finished with an antiglare coating, the mirror being one of a convex surface and a flat surface;

a plastic mount supporting the mirror, the plastic mount having a back exterior surface and a mounting hole in a center of the back;

an extension arm having a curving upper portion comprising a first ball joint located at a first end of the extension arm, the first ball joint mounted in the mounting hole of the plastic mount; wherein,

the frictional board further comprises two planar surfaces extending along a longitudinal length of the mirror on two sides of the ball pit,

the adjustment part comprises two screws for adjusting the friction applied against the first ball joint,

the frictional board with a centrally-located ball pit comprises a screw hole on each of two planar surfaces extending on two sides of the ball pit,

each screw hole securing one of the two screws, wherein,

user-adjustment of the two screws adjusts the friction applied against the first ball joint,

the extension arm comprising a second ball joint located at a second end of the extension arm, the second ball joint mounted in the mounting hole of the mounting box, wherein,

an frictional board further comprises two planar surfaces extending along the longitudinal length of the mounting baseon two sides of the ball pit,

the frictional board with a centrally-located ball pit also serves as a bottom of the mounting box,

the frictional board further comprises two screw holes on each of two sides of the cantrally-located ball pit.

the adjustment part comprises two screws for adjusting the friction applied against the second ball joint.

Evidence appendix

See the enclosed copies of Appellant's application, prior art references and Office action (final).

Other related proceeding appendix

See the copy of the letter from NHSA referred to as authoritarian publication.

Xiaoda Xiao

Appendix
Application No. 10/775,697

INTERIOR BLIND SPOT MIRROR

This application claims benefit to US provisional patent application No. 60/505,279 Sept. 23/2003.

TECHNICAL FIELD

The invention relates to an interior blind spot rear view mirror for motor vehicles, and more specifically to a mirroring system having the standard adjustment features that allow a driver of a vehicle to adjust the mirror to such a desired position that the mirror of the present invention can meet the eye level of a driver, and completely eliminate the blind spot. The interior blind spot mirror of the present invention includes a rectangular, or oval-shaped mirror constructed of convex glass or plexiglas, a curving extension which serves as a bridge between the above mentioned mirror and a separate base which has a pad constructed of resilient material such as polymer attached to the bottom of the separate base. Two double stick foam attachment means attached to the above mentioned pad to enable the separate base of the interior blind spot mirror to be fitfully mounted to any type of the window frames of motor vehicles which are defined hereafter as pillar(s) and provide a secure base for the mounting of the interior blind spot mirror of the present invention. Specifically, the present invention is a mirror which can be rectangular or oval-shaped and which includes a round, curved extension attached on the back of the mirror serving as a bridge between the mirror and a separate base. A ball joint is placed on either end of the extension, the function of which is to flexibly and yet substantially secure the blind spot mirror to a chosen position from which it can reflect whatever is within the blind spot. Additionally, the interior blind spot mirror of the present invention

can also be mounted on the passenger's side to further provide a device that can eliminate the blind spot on the passenger's side.

A separate base of the interior blind spot mirror includes a U-shaped mounting box on top into which the extension of the mirror is slidably affixed. Because of a pad of soft attachment on the bottom of the separate base of the present invention, the separate base provides a flexible attachment to all types of pillars, whether it is curving, square or flat, and therefore enables the interior blind corner mirror of the present invention to fit all types of vehicles including cars, vans and trucks.

BACKGROUND INFORMATION

Constant lane-switching, which is inevitable while driving on a busy highway, has been causing greater inconvenience for a driver of a motor vehicle today than five years ago, and it goes without saying that the situation will aggravate in the next five years due to the rapidly increasing number of cars which make the already crowded highway system, especially around metropolitan, or densely populated urban areas become more crowded. As a result, while driving in highway zones like that, a driver has to constantly turn his/her head around to look backward at what is known as the blind spot, a spot neither the interior rearview mirror, nor the exterior side rear-view mirror of a vehicle is able to reflect, to make sure there is not a passing vehicle there before he/she switches to the passing lane.

For the better part of history, automobiles don't have a blind spot mirror to speak of, although accidents caused directly or indirectly due to the failure of noticing the blind spot had concerned the insurance companies, the engineers and designers in the profession for a long period of time, especially since the last quarter of the twentieth

century. In more recent years, a round convex mirror known as fisheye was invented to install on top of the side rearview mirror to serve, by using its unique feature of convexity to widen the capacity of a conventional mirror's reflecting coverage, as the blind spot mirror. And upon the invention of this tiny convex mirror an improvement was made and a larger, round convex mirror was built to install on trucks, usually below the exterior side rearview mirror to serve as a blind spot mirror. Since the improved convex mirror was larger than "the fisheye", its capacity of reflecting coverage was greater than its predecessor's. And a relatively smaller round convex mirror was consequently made to attach on top of the exterior side rearview mirror by means of double stick foam adhesive to serve as the blind mirror for smaller vehicles such as family cars, vans, jeeps etc.

Literally, many prior art patents exist in this area of technology which, in theory, should substantially eliminate the blind spot. In reality, however, none of them is able to convince a driver that the blind spot has been completely eliminated, on the contrary, due to the position of the exterior rearview mirror upon which the convex blind mirror was attached, the round convex blind spot mirror, while reflecting images inside the blind spot mirror, will also reflect images which are not in the blind spot. As a result a driver has to discern which one of these images is inside the blind spot and which is not. Moreover, only those bigger vehicles such as trucks and buses have enough room for the installation of a full-sized convex mirror without sacrificing the area of the side rearview mirror, as the exterior convex blind spot mirror can only be installed outside the vehicle, a family vehicle has to sacrifice at least one third of the area of its side rearview mirrors in order to put on an exterior blind spot mirror.

These deficiencies of the exterior blind spot mirror limited its application, while on the other hand the request of the blind spot mirror for automobiles, especially family vehicles whose numbers are increased rapidly in recent years become more urgent. And it is commonly acknowledged that the lacking of a blind spot mirror is one of the most dangerous factors that may cause terrible accidents on highways.

Clearly, the invention of the exterior convex blind spot mirror is the advancement in the area of safety to the drivers under heavy traffic circumstances, yet this advancement is only applicable to bigger vehicles such as trucks, buses which have enough room below the side rearview mirror for the installation of the exterior convex blind spot mirror. That is, an exterior convex blind spot mirror is only effective when it is used properly for bigger vehicles, although, of course, due to the limitation of its position, the exterior convex blind spot mirror doesn't provide for a driver of a bigger vehicle with a complete view when a small vehicle passes by.

Since such an advancement is not properly done, a small-sized vehicle such as a family car, a van, or a pick-up etc. still suffers the inconvenience caused by the blind spots.

A number of blind spot mirrors have been developed which attempt to properly eliminate the blind spots. Examples of this prior art of blind spot mirrors include US Pat. No. 4,182,552 discloses a composite mirror assembly adapted to be mounted adjacent the driver of a vehicle to enable the driver to view objects within an area normally hidden from view by conventional vehicle mirrors. An additional mirror is positioned at an angle with respect to the conventional side mirror.

US Pat. No. 4,200,359 discloses a small, flat mirror being mounted through use of a wedge-shaped adhesive block to the inside portion of a conventional side view mirror. The block positions the small mirror at an angle of about 15 degrees to 20 degrees with respect to the plane of the side view mirror to thereby eliminate the blind spot.

US Pat. No. 5,044,739 discloses a smaller auxiliary convex mirror mounted on a larger mirror so that the smaller auxiliary convex mirror may be tilted to a limited extent to more precisely position the wide angle field of view it provides. The convex mirror is attached to a tilting plate by an adhesive means, and the tilting plate has a central projecting member with a cavity. A support plate attached to the smooth base mirror by another adhesive means has a corresponding central bar with a spherical head which engaged in the cavity of the tilting plate so that the convex mirror and tilting plate are pivotable.

US Pat. No. 5,566,028 discloses an apparatus, which exposes the blind spot in the direction in which a vehicle makes a turn, to be installed at the back of mechanically or electrically operated side rearview mirrors. A mechanical device, connected to a mirror unit and to the frame, having a diaphragm sealingly disposed therein. When a winker switch is activated, the diaphragm housing is activated by vacuum, causing the diaphragm to be sucked backwards, resulting in said mirror unit pivoting backwards to expose the blind spot . . .

US Pat. No. 6,076,934 discloses a vehicle blind spot mirror with a mirror having a single plane outwardly curved surface, and extension member attached to the rear portion of the outwardly curved mirror and having a double stick foam tape attachment means on the opposite surface of the extension, allowing the extension and attached blind spot

mirror to be affixed to a vehicle's existing rearview mirror even if the rear view mirror is set in a recessed frame, thereby allowing for a larger blind spot mirror than the original rearview mirror.

US Pat No. 6,523,965 discloses an improved mirror for use on most types of motor vehicles (cars and trucks) includes two flat reflecting surface used as the principal rearview mirror, and a second reflecting surface being oriented so as to provide a reflected image of traffic in the blind spot mirror. A support structure holds the principal reflecting surface bound to the larger reflecting surface, the blind spot mirror. Although the blind spot mirror is larger, only portions of it appear to the driver as it is mostly covered by the principal reflecting surface. The support structure between the two reflective surfaces has the shape of a wedge necessary for maintaining the blind spot mirror at the proper angle so as to reflect blind spot traffic to the eye of the driver.

Although these prior art blind spot mirror units are adequate for the purpose for which they were intended, these devices either fail to completely eliminate the blind spot or cast the intactness of the side rearview mirror by taking a considerable portion of the side rearview mirror for the attachment of the blind spot mirror. The conventional side rearview mirror of the driver's side, which is just big enough for a driver of a vehicle to view objects within that angle, will become rather ineffective even if a quarter of it is taken for the installation of the blind spot mirror, leave alone the possibility of visionary confusion, such as broken, fragmental images in both mirrors, that the combination of the two mirrors will cause.

Therefore, the prior art blind spot units are only suitable for a bigger vehicle such as a truck, a school bus that has enough rooms below the side rearview mirrors on either

side of the driver for the installation of the blind spot mirror units. It would obviously be preferable to provide a more effective, flexible device for smaller vehicles to eliminate the blind spot without sacrificing the conventional side rearview mirrors.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an interior blind spot mirror capable of covering the dead angle and completely eliminating the blind spot.

It is another object of one or more embodiments of the present invention to provide an interior blind spot mirror that can be flexibly mounted on the window frame so that it fits all types of motor vehicles, especially for family cars, vans, and trucks as well.

It is another object of the present invention to provide an interior blind spot mirror which, after being mounted on the window frame, can be adjusted to fit drivers of different height.

It is another object of the present invention to provide a separate base for the interior blind spot mirror that can fit all types of pillars of the car windows.

It is another object of the present invention to provide an interior blind spot mirror to be flexibly taken off and mounted on the separate base.

It is another object of the present invention to provide an interior blind spot mirror that comprises a separate base so that a user of the present invention can mount the base which has a double foam stick attachment means on its bottom onto a pillar and allow the adhesive to reach its ultimate strength before mounting the blind spot mirror on the separate base.

It is another object of the present invention to provide an interior blind spot mirror that comprises a U-shaped mounting box on top of the separate base so as to enable the extension of the interior blind spot mirror to be slidably affixed to the separate base.

It is another object of the present invention to provide an interior blind spot mirror having a base constructed of soft resilient material that enables the base to fit various types of pillars of the window frames of vehicles.

It is another object of the present invention to provide an interior blind spot mirror that is cost efficient to install in a vehicle, making the vehicle safer.

It is another object of the present invention to provide an interior blind spot mirror to the passenger's side to eliminate the blind spot on the right side of the vehicle.

It is a further object of the present invention to provide an interior blind spot mirror which is of simple construction, which achieves the stated objects in a simple, effective and inexpensive manner, and which solves problems and satisfies needs existing in the art.

These and other objects and advantages are obtained by the interior blind spot mirror of the present invention, the general nature of which may be stated as including a mirror (rectangular or oval) having an extension, two ball joints, a U-shaped mounting box and a separate base which is removably attached to the interior side window frame of a vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiments of the invention, illustrative of the best mode in which The inventor has contemplated applying the principles, are set forth in the following

description and are shown in the drawings and are particularly and distinctly pointed out and set forth in the appended claims.

FIG. 1 is a front view of the interior blind spot mirror of the present invention showing the mirror properly positioned to show a passing car in what is defined as the blind spot on the driver's side.

FIG. 2 is a rear view of the interior blind spot mirror of the present invention showing the mirror, the first ball joint between the mirror and the extension, the extension, the second ball joint between the extension, the joint box, and the separate base.

FIG. 3, including A and B, are two section views of the ball joints and the structural detail of the interior blind spot mirror, the extension and the joint box.

FIG. 4 includes three side elevations of the separate base when they are mounted on three geomorphically different surfaces, the curving, the square and the flat.

FIG. 5 is a top view of a car with two interior blind spot mirrors mounted on both pillars of the window frames inside the vehicle.

FIG. 6 is a sectional perspective of the second ball joint showing the relationship between the extension, the ball joint, the joint box, the separate base, the soft pad and the double side foam attachment.

FIG. 7 is a front elevation of an oval-shaped mirror which has a soft base that can fit pillars of different contours.

FIG. 8 A shows the wedging connection between the soft base and the U-shaped mounting box.

FIG. 8 B is a section of the soft base when it is connected with the mounting box and the extension of the interior blind spot mirror on the top.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Accordingly, the interior blind spot mirror of the present invention is shown in **FIG. 1, 2** and is indicated at **10** which generally includes a rectangular or oval-shaped mirror **20**, an extension **21** seen in **FIG. 2, 3, 4, 6** and **7**, and a separate base **23** seen in **FIG. 2**. Having the capacity of reflecting whatever is hidden in the blind spot, the interior blind spot mirror of the present invention provides for a driver with such a device that prevents him/her from turning around to look backward to check if there is a passing vehicle hidden inside the blind spot while driving.

Although base **32** of the interior blind spot mirror of the present invention shown in **FIG. 4** can be installed on different shaped window frames of vehicles by means of applying a pad of soft resilient material sandwiched between said separate base **32**, and double stick foam attachment means **34** as seen in **FIG. 4**, the interior blind spot mirror of the present invention can also be mounted on all types of pillars by applying a soft base which is constructed of polymer or other soft materials as seen in **FIG. 7**.

FIG. 1 illustrates that, when properly positioned, the interior blind spot mirror of the present invention is able to reflect a passing vehicle inside the blind spot. The interior blind spot mirror **10** is mounted on pillar **15** of a vehicle and forms **7-10** degrees with the exterior side rearview mirror **12**, in which position the interior blind spot mirror of the present invention can completely eliminate the blind spot.

Along with other parts, **FIG. 2** illustrates that the interior blind spot mirror of the present invention has two ball-joints **25** and **28** at either end of extension **21**which has a

curving upper part. Having mounted the interior blind spot mirror of the present invention on the pillar of the window frame **15,** as is seen in **FIG.1**, a driver of a vehicle can easily position said interior blind spot mirror **10** in a generally parallel relationship with exterior rearview mirror **12** by adjusting the two ball joints of which one controls extension **21**, the other, mirror **20**. After this is done, a driver can further adjust mirror **20** in the same manner until said mirror reflects the window on his/her left side. If he/she can see in the mirror the major part of the window on his/her left side, the blind spot on that side is eliminated. With the same method said interior blind spot mirror **10** can be mounted on pillar **16** as seen in **FIG.5** and the blind spot on the passenger's side can be completely eliminated, too. Each of said two ball joints includes a base board that is fixed in a tightly frictional manner with said ball by two screws as seen in **FIG. 3 A** and **B. FIG. 3 A** shows the top rod of ball **28** being inserted into the lower end of extension **21** while the bottom of ball **28** fits into a concave defined as ball pit **60** on base board **55** which has two holes on either side of said ball pit to hold screws **45** and **46.** Said ball **28** and said base board **55** are confined in box **22**, and said two bolts **45** and **46** control the tautness of the friction between said ball **28** and said base board **55**. The purpose here is to make extension **21** be adjustable in all directions and yet be affixed in any position. **FIG. 3 B** indicates that the top rod of ball **25** being inserted into the upper end of extension **21** and the bottom of ball **25** fits into ball pit **61** on base board **56**, and two bolts **43** and **44** control the tautness of the friction between said ball **25** and said base board **56** which is located inside back cover **24** of mirror **20.** The purpose here is to make said mirror **20** be adjustable in all directions.

FIG. 4 A, B and **C** are three embodiments of the separate base of the interior blind spot mirror of the present invention applied on three typically different shaped pillars of the window frames of the vehicles. Between separate base **32** and double stick foam attachment **34** is a pad of soft resilient material such as polymer that enables separate base **32** to fit different shaped pillars. Said separate base **32** includes a U-shaped mounting box **23** on the top so that the bottom of joint box **22** can be slidably fit into said mounting box **23** and said interior blind spot mirror of the present invention is in position. In use, a driver should mount separate base **32** onto pillar **15** and then, in order to let the adhesive material reach its ultimate strength, waits for a couple of hours (or longer) before mounting said mirror **20** on it.

To mount the interior blind spot mirror of the present invention on the pillar on the driver's side of a vehicle, a user should first measure the interior blind spot mirror of the present invention on the pillar of the window on his/her left side with the top of said mirror **20** about two inches higher than the top of said side rearview mirror **12**. When that is done, a user may take said separate base **32** off said joint box **22** on the bottom of said extension **21**, and then peel off the tape on the double stick foam adhesive; and then press said separate base **32** on the spot chosen for the mounting of the interior blind spot mirror of the present invention. Having fixed said separate base **32** on pillar **15**, a user should wait for at least two hours to let the adhesive reach its ultimate strength before inserting said extension **21** of the present invention into said mounting box **22**.

When the interior blind spot mirror of the present invention is properly mounted on pillar **15**, a user can adjust mirror **20** by turning both extension **21** and mirror **20** until the blind spot completely disappears. The blind spot mirror of the present invention can also

be mounted on pillar **16** of a vehicle on the passenger's side, as a result of which the blind spot on the passenger's side can be eliminated, too.

The main structures of the present invention, such as said separate base **32**, said extension **21**, said mirror frame **24**, said ball joint **27** and **28** are constructed of ABS plastic while said bolts **43**, **44**, **45, 46** are constructed of alloy or stainless steel; said mirror **20** is constructed of antiglare, shatterproof glass or plexiglas and is made convex. Said pad **33** is constructed of resilient material such as polymer to enable said base **32** to fit different shaped pillars as is shown in **FIG. 4**; and said double stick foam adhesive **34** is a kind of adhesive for plastic, leather and synthetic materials.

FIG. 8 shows the embodiment of soft separate base **80**, an alternative of separate base **32**, featuring with central piece **81**, a protuberant, rectangular piece with wedged-in edges, of which the purpose is to enable U-shaped mounting box **70**, which also has wedged-in sides, to be fixed on said base **80**. Being constructed of soft material such as polymer, said soft separate base **80** can fit all geomorphic surfaces more properly than said separate base **32,** and looks better than said separate base **32** because the former is thin and of one piece while the later has a pad that is at least as thick as four millimeter.

What is claimed is:

1. A interior blind spot mirror comprising:

a rectangular, or an oval-shaped mirror constructed of shatterproof mirror glass or plexiglas and is finished with antiglare coating; said rectangular, or oval-shaped mirror can be convex, or conventional;

a plastic mount with a curving back to said mirror;

a hole in the center of the back of said plastic mount for installing the ball joint of the extension;

a frictional board with a ball pit in the center is installed inside said plastic mount for adjusting the tightness of said ball joint of said mirror;

2. The interior blind spot mirror recited in claim 1 further comprising an extension which serves as a bridge between said mirror and the separate base;

3. The extension recited in claim 2 includes two ball joints installed on either end of said extension so that said mirror can be flexibly adjusted;

a ball joint box is built on the bottom of said extension where said extension is connected with said separate base, while another ball is set on the top of said extension where said extension is connected to said mirror.

4. The interior blind spot mirror recited in claim 2, wherein said separate base comprises a mounting box with a U-shaped top for the bottom of said ball joint box to be slidably affixed into said separate base.

5. The interior blind spot mirror recited in claim 3 further comprises a soft pad constructed of resilient material such as polymer attaches to the bottom of said separate base so as to enable said separate base to fit different shaped pillars of the vehicles.

6. The interior blind spot mirror recited in claim 4 further comprises a double stick foam adhesive to the bottom of said soft pad so that said separate base can be attached to the side pillar of the window frame of a vehicle.

7. The interior blind spot mirror recited in the above claims may alternatively comprise a soft base which features with a protuberant, rectangular center piece;

a center piece on said soft base features with cut-in edges along the major axis so that said mount box can be glued on it.

8. The interior blind spot mirror recited in claim **6** further comprises a mounting box which features with cut-in edges on its major axis so that said mount box can be mounted on said protuberant central piece of said soft base.

9. The interior blind spot mirror recited in claim **1** also includes four screws for adjusting the friction of said ball joints.

10. The interior blind spot mirror recited in claim **8** further comprises two base boards each having a ball pit in the center and two holes in either side of said ball pit for said screws to be driven in.

11. The interior blind spot mirror recited in claim **1** can be mounted on the pillar of the window frames in the front of a vehicle, and can be mounted on either side of the window frames of a vehicle.

ABSTRACT

An interior blind spot mirror which is mounted on the pillar of the window frame inside a vehicle on the driver's side completely eliminates the blind spot. The interior blind spot mirror includes an extension serving as a bridge between the mirror and the base which can be removed from the extension. There are two ball joints on either end of the extension which enable a user to conveniently adjust the mirror to a desired position. The base includes a soft pad sandwiched between the base and the double stick foam adhesive so that the base can fit pillars of different shapes. The interior blind spot mirror also includes an alternative base constructed of soft material such as polymer which can be

mounted on all shapes of pillars of the window frames without the soft pad being attached to the bottom of the base. There is a mounting box on top of the base having a U-shaped notch for the joint box on the lower end of the extension to be slidably affixed onto the base. In use, a driver of a vehicle should first mount the base on the pillar of the window frame on his/her left side and wait for two hours or more in order to let the adhesive reach its ultimate strength before inserting the extension of the mirror into the U-shaped notch on the mounting box. The interior blind spot mirror can be mounted on the passenger's side as well as on the driver's side.

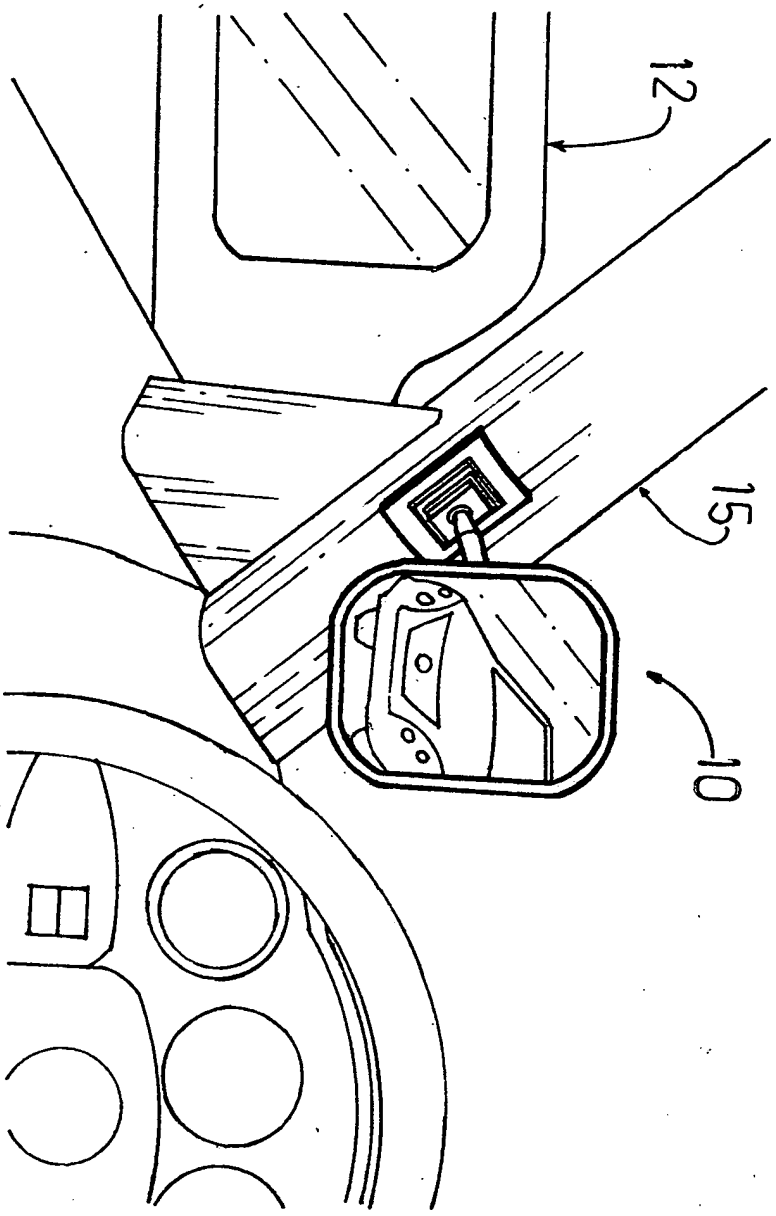

FIG-1

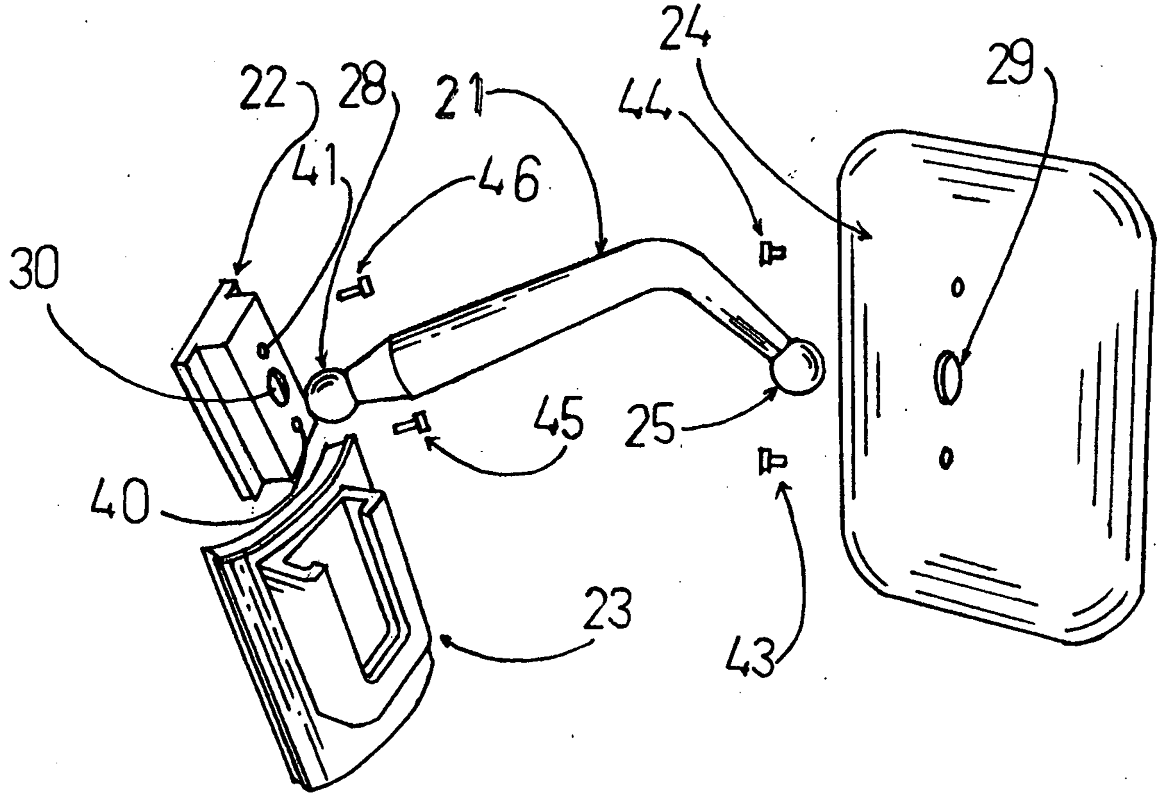

FIG.-2

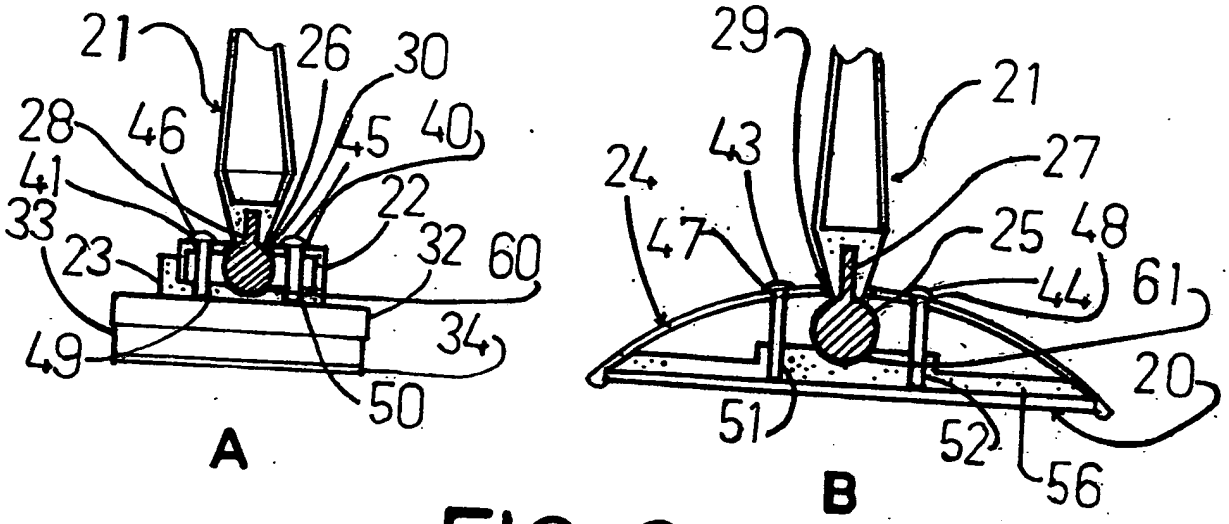
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FIG.-3

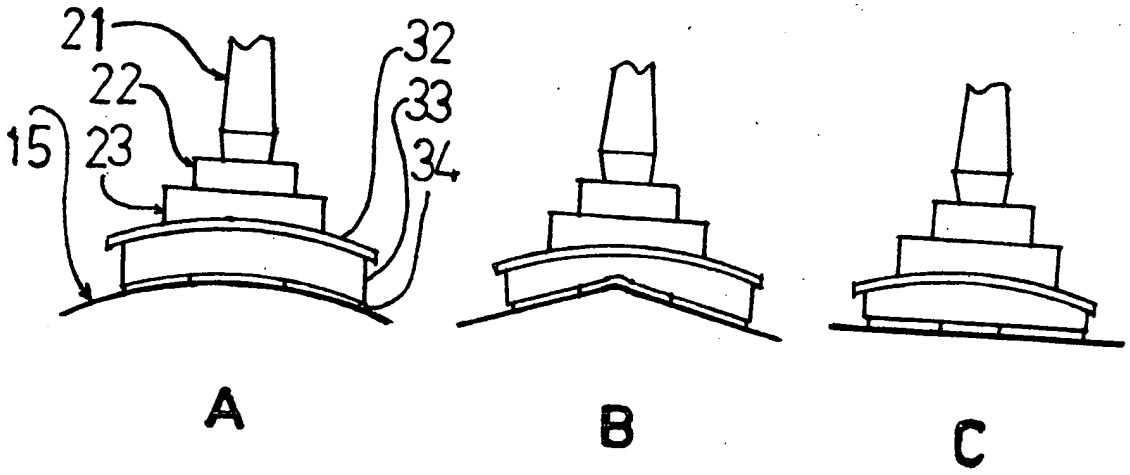
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FIG.-4

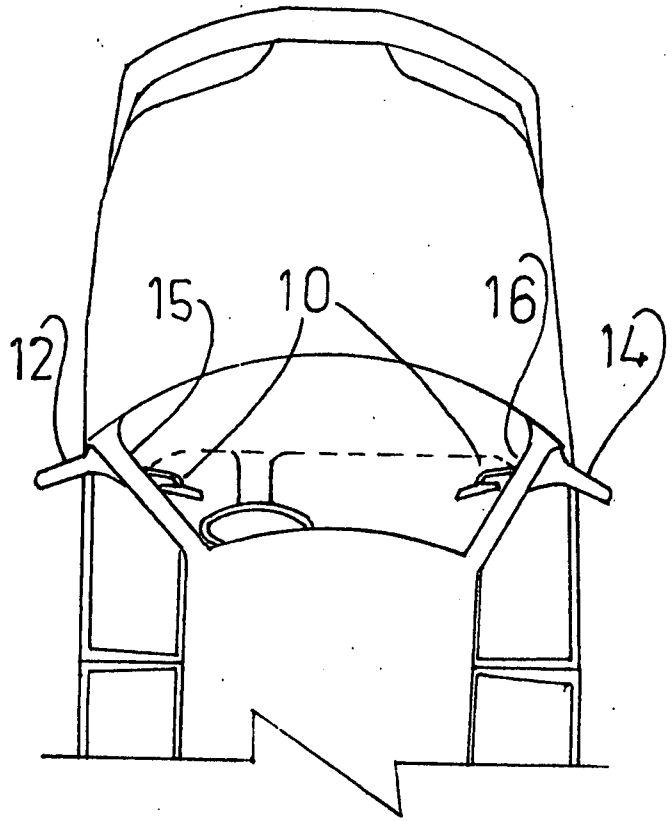

FIG.-5

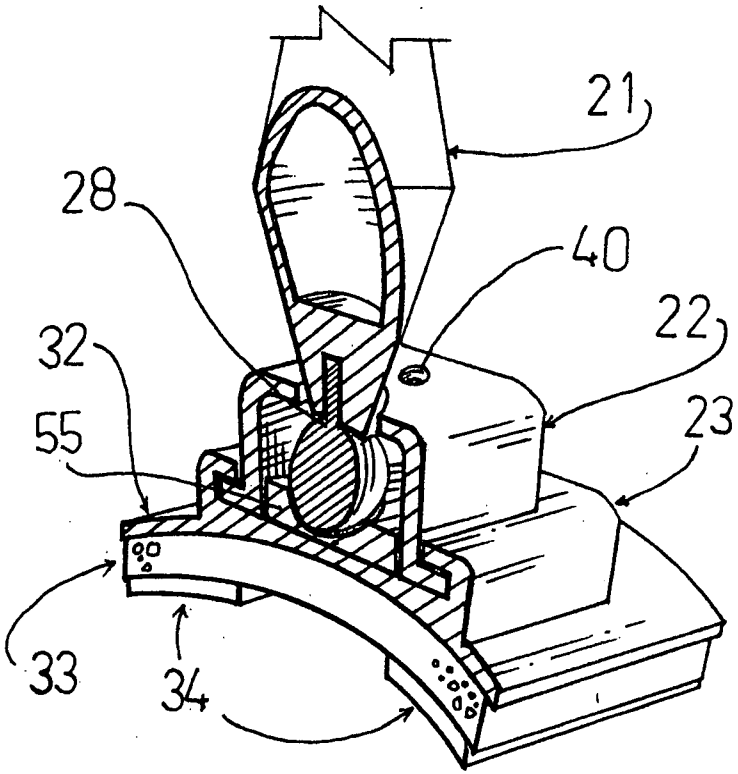

FIG.-6

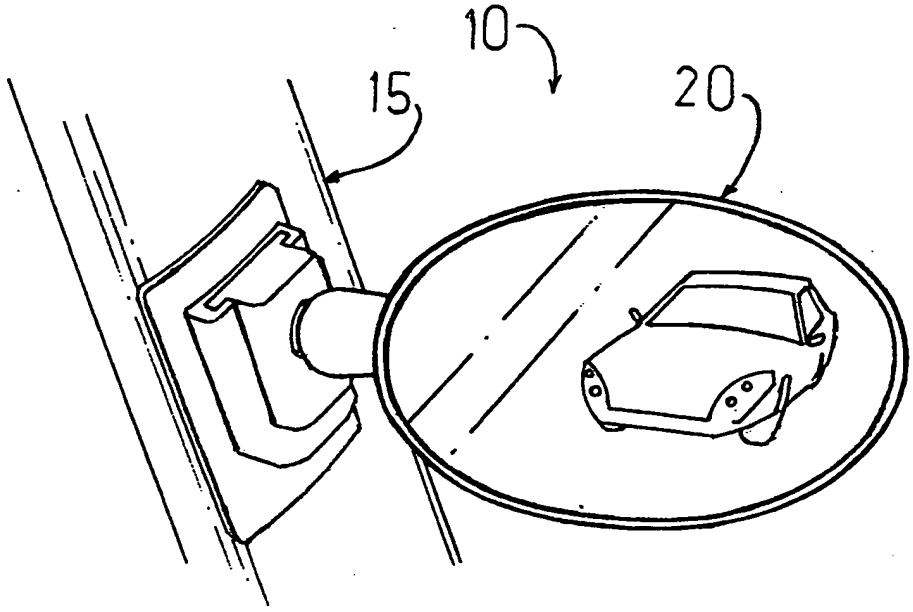

FIG.-7

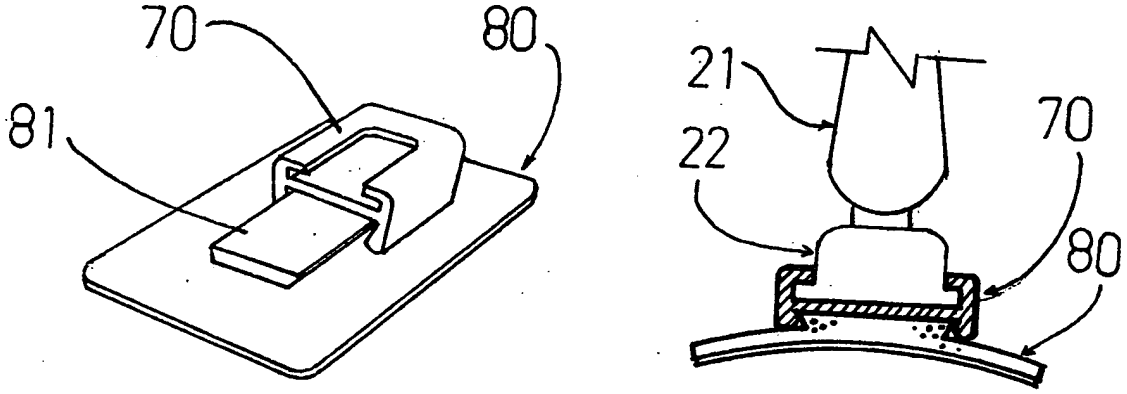

FIG.-8

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,697	02/11/2004	Xiaoda Xiao	~~5572-1002~~	9195

7590 10/17/2005

XIAODA XIAO
135 Belchertown Road
Amherst, MA 01002

EXAMINER	
KHATRI, PRANAV V	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/775,697	XIAO, XIAODA	
	Examiner	Art Unit	
	Pranav V. Khatri	2872	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12-14, 16-17, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLine (US Patent No. 6,540,193) in view of Stern (US Patent No 3,741,632) and in further view of Sharp (US Patent No. 4,244,548).

Regarding claims 12 and 23, DeLine discloses a mirror having one of a rectangular and an oval shape (see Fig 1), convex surface and a flat surface (Fig 1); plastic mount supporting the mirror (Col 12 Lines 48-52, Fig 10, Col 3 Lines 42-43, and Col 11 Lines 57-58), plastic mount having curving back exterior surface (as seen in Fig 11 numeral 510) and a mounting hole (510b) in a center of the back (510); an extension arm (514) comprising a first ball joint (514c) located first end of the extension arm (514), the first ball joint (514d) mounted in the mounting hole (510b) of the plastic mount (510). DeLine does not explicitly teach a mirror being one of shatterproof glass and a Plexiglas, the mirror finished with antiglare coating; a frictional board with a centrally-located ball pit, the frictional board located inside the plastic mount intermediate the plastic mount and the mirror; and an exterior accessible adjustment, extending through the plastic mount and acting in cooperation with the frictional board for adjusting a tightness of the first ball joint against the plastic mount; and extending through the

plastic mount and into the frictional board, the adjustment part providing user-adjustment of tightness of the first ball joint against the plastic mount.

However, Stern teaches of a mirror being one of shatterproof glass and a Plexiglas (see Stern Col 2 Lines 11-13), the mirror finished with antiglare coating (see Stern Col 2 Lines 62-63). Further, Sharp teaches of a frictional board (see Sharp Fig 3 Numeral 50) with a centrally-located ball pit (34), the frictional board located inside the plastic mount intermediate the plastic mount and the mirror (as seen in Fig 1 of sharp); and an exterior accessible adjustment (see Fig 1 and 3, numeral 60), extending through the plastic mount (16) and acting in cooperation with the frictional board (50) for adjusting a tightness of the first ball joint against the plastic mount (Col 4 Lines 15-26); and extending through the plastic (16) mount and into the frictional board (50), the adjustment part providing user-adjustment of tightness of the first ball joint against the plastic mount (Col 4 Lines 15-26).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the teachings of a rearview mirror of DeLine with the a mirror of Stern and a mirror assembly of Sharp for the purpose of reducing unwanted glare and increasing the viewing area, and for the purpose of adjusting the tightness of the ball joint against the mount, and for adjusting the overall tightness or firmness of the mirror assembly.

Regarding claim 13, DeLine in view of Stern and in further view of Sharp discloses a mounting base (see Sharp Fig 1 Numeral 20) with a mounting surface (29) for detachably mounting (see Sharp Col 3 Lines 8-14) the mounting base (20) to a

surface (vehicle body), the extension arm (31) connecting the mounting base (20) to the plastic mount (10).

Regarding claim 14, DeLine in view of Stern and in further view of Sharp discloses a ball joint box (see DeLine Fig 11 Numeral 516b) secured to the mounting base (516); and second ball joint (514b) located at second end of the extension arm (514), the second joint (514b) mounted within the joint box (516b), wherein, each end of the extension arm (514) provides a flexible adjustment point so that the mirror can be flexibly adjusted at either end of the extension arm (Col 13 Lines 3-8).

Regarding claims 16 and 17, DeLine in view of Stern and in further view of Sharp discloses a pad (see DeLine Fig 2, 16a with adhesive) of resilient material attached to a bottom of the mounting base, the pad allowing mounting of the mounting base by fitting to different shaped vehicle pillars (Col 4 Lines 48-51 and Lines 62-66), and further a double-stick foam adhered to a bottom of the pad (see DeLine Fig 2, 16a with adhesive), the double-stick foam allowing mounting the mounting base to a side pillar of a vehicle window frame (Col 4 Lines 48-51 and Lines 62-66).

Regarding claim 24, DeLine in view of Stern and in further view of Sharp discloses wherein the frictional board (see Sharp Fig 1 and 3) further comprises two planar surfaces (Numeral 50 extends on both sides of the ball pit) extending along a longitudinal length of the mirror on two sides of the ball pit.

Regarding claims 25 and 26, DeLine in view of Stern and in further view of Sharp discloses the claimed invention except for two screws for adjusting the friction applied against the first ball joint; and the frictional board with a centrally-located ball pit

comprises a screw hole on each of two planar surfaces extending on the two sides of the ball pit, each screw hole securing one of the two screws, wherein, user-adjustment of the two screws adjusts the friction applied against the first ball joint. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have two screws, one on each side of the ball pit, for adjusting the friction applied against the first ball joint, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v Bemis Co.*, 193 USPQ 8.

Claims 15,18, 19, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLine (US Patent No. 6,540,193) in view of Stern (US Patent No 3,741,632) and in further view of Sharp (US Patent No. 4,244,548) and in further view of Bury et al. (US Patent No. 3,928,894).

Regarding claim 15, DeLine in view of Stern and in further view of Sharp discloses the claimed invention as set forth above except lacks the teaching of a mounting box with a U-shaped top surface within the mounting base, the mounting box slidably accepting the ball joint box so that the ball joint box is slidably affixed within the mounting base against the U-shaped top surface.

However, Bury et al. teaches of a mounting box (see Bury et al. Fig 1 Numeral 10) with a U-shaped top surface within the mounting base (20), the mounting box (10) slidably accepting the ball joint box (20) so that the ball joint box (20) is slidably affixed within the mounting base against the U-shaped top surface (see Col 2 Lines 50-60).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the teachings of a rearview mirror of DeLine in view of Stern and in further view of Sharp with a mounting system of Bury et al. for the purpose of providing a portion of the assembly to be adhesively preassembled to the windshield and a second portion of the assembly to be removably associated with the first member (see Bury et al. Col 1 Lines 61-65).

Regarding claim 18, DeLine in view of Stern and in further view of Sharp and in further view of Bury et al. discloses wherein, the mounting base comprises (see Bury et al. Fig 1) i) a central piece of a protuberant (18), rectangular shape and with wedged-in edges along a major axis (as seen in Fig 1), and ii) a U-shaped mounting box (10) with wedged-in sides (15), the mounting box (10) slidably accepting the ball joint box (20) so joint box (20) slidably affixed within the mounting base against the U-shaped mounting box (see Col 2 Lines 50-60), the ball joint box glued into the mounting box (if the ball joint box is glued into the mounting box, the mounting box can no longer slide the box joint, and this is a contradiction), it is known in the art to use an adhesive to stick the joint box member and the mount box.

Regarding claim 19, DeLine in view of Stern and in further view of Sharp and in further view of Bury et al. discloses a mounting box (see Bury et al. Fig 1 numeral 10) comprising wedged-in edges on a major axis (as seen in Fig 1 numeral 18 or 15), the mounting box provided on a protuberant central piece of the mounting base.

Regarding claims 20 and 21, DeLine in view of Stern and in further view of Sharp and in further view of Bury et al. discloses the claimed invention except for four screws for adjusting the friction applied against the first and second ball joints; and wherein, the frictional board with a centrally-located ball pit comprises a screw hole on each of two sides of the ball pit, each screw securing one of the four screws, the ball joint box comprises a frictional board with a screw hole on each of two side the ball pit, the screw holes of the ball joint box frictional board each securing one of the four screws, wherein, user-adjustment of the screws adjusts the friction applied against the first and second ball joints. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have four screws, one on each side of both ball pits, for adjusting the friction applied against the first and second ball joints, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v Bemis Co.*, 193 USPQ 8.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeLine (US Patent No. 6,540,193) in view of Stern (US Patent No 3,741,632) and in further view of Sharp (US Patent No. 4,244,548) and in further view of Manzoni (US Patent No. 4,558,840).

Regarding claim 22, DeLine in view of Stern and in further view of Sharp discloses the extension arm (see DeLine Fig 11, numeral 514) connecting the mounting base (516) to the plastic mount (510) except is silent about the teaching of a mounting base with a mounting surface for mounting the mounting base on either of a driver side and a passenger side pillar of a vehicle front window frame.

However, Manzoni teaches the mirrors assembly mounting base with a mounting surface for mounting the mounting base on either of a driver side and a passenger side pillar of a vehicle front window frame (see Manzoni Fig 1, Col 1 Lines 45-46 and Col 1 Line 65 –Col 2 Line 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to mount the mirror to an appropriate frame or support member for the purpose of increasing the viewing angle.

Response to Arguments

Applicant's arguments with respect to claims 12-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pranav V. Khatri whose telephone number is 571-272-8311. The examiner can normally be reached on M-F, 8:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Pranav Khatri
Examiner
10/07/2005

EUNCHA P. CHERRY
PRIMARY EXAMINER

Notice of References Cited	Application/Control No. 10/775,697	Applicant(s)/Patent Under Reexamination XIAO, XIAODA	
	Examiner Pranav V. Khatri	Art Unit 2872	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,540,193	04-2003	DeLine, Jonathan E.	248/481
	B	US-3,741,632	06-1973	Stern, David	359/603
	C	US-4,244,548	01-1981	Sharp, Bernard C.	248/481
	D	US-4,558,840	12-1985	Manzoni, Stephane	248/549
	E	US-3,928,894	12-1975	Bury et al.	248/467
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Evidence Appendix

United States Patent [19]

Sharp

[11] **4,244,548**

[45] **Jan. 13, 1981**

[54] **MIRROR CLAMPING ASSEMBLY**

[75] Inventor: **Bernard C. Sharp**, White Plains, N.Y.

[73] Assignee: **Parker-Hannifin Corporation**, Shelton, Conn.

[21] Appl. No.: **55,601**

[22] Filed: **Jul. 9, 1979**

[51] **Int. Cl.**³ **A47G 1/24**

[52] **U.S. Cl.** **248/481**; 403/143

[58] **Field of Search** ..... 248/481, 482, 484; 403/135, 137, 142, 143; 74/501 M; 350/307

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,386,959	8/1921	Severance	403/143 X
2,089,463	8/1937	Ritz-Woller	248/481
2,588,825	3/1952	Goodman et al.	248/481 X
2,613,575	10/1952	Falge	248/481
2,763,188	9/1956	Bertell	248/484
3,575,375	4/1971	Strem	248/481
3,603,555	9/1971	Lohr	248/481

FOREIGN PATENT DOCUMENTS

1963460	7/1971	Fed. Rep. of Germany	350/307
2258296	6/1973	Fed. Rep. of Germany	74/501 M

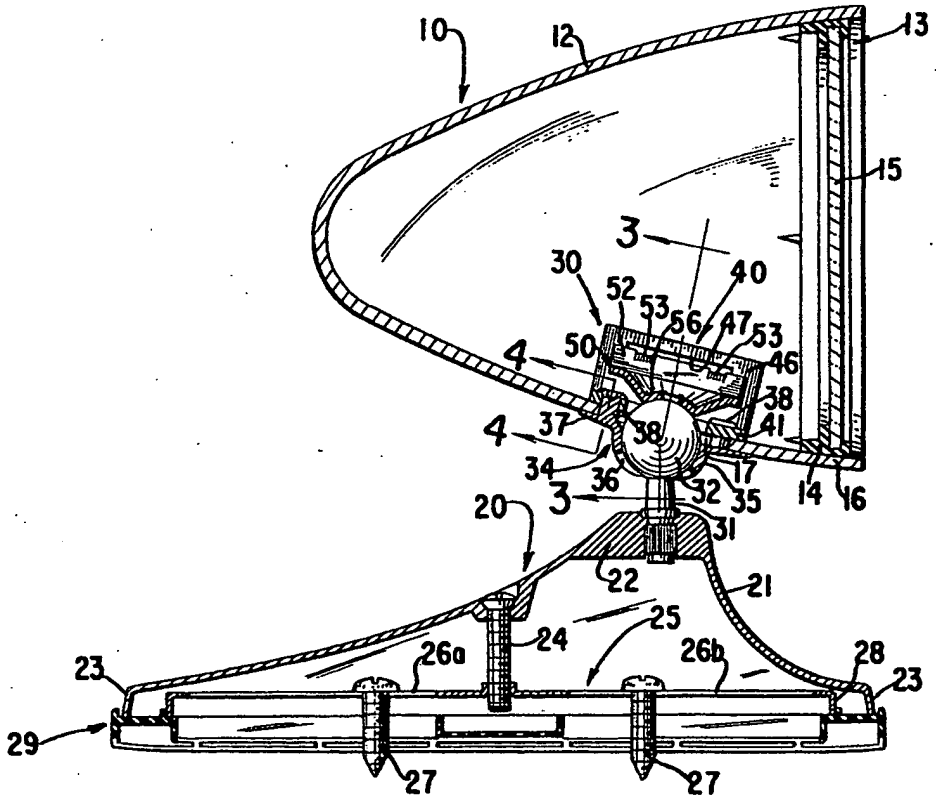
Primary Examiner—J. Franklin Foss

Attorney, Agent, or Firm—Albert C. Johnston; Louis H. Reens

[57] **ABSTRACT**

An improved ball joint structure for clamping a rear view mirror head tightly yet turnably on a supporting ball member includes a ball seat member and a body clamping member fixed at the outer and inner sides of housing wall portions bordering an opening in which a mirror supporting ball is disposed, a ball clamping member mounted on the body clamping member and having a contoured portion to grip the inner side of the ball, and means adjustable from outside the wall for holding the ball clamping member under a desired tension against the ball. The body and ball clamping members have coacting formations that limit displacement of the ball clamping member in the direction away from the ball.

8 Claims, 4 Drawing Figures



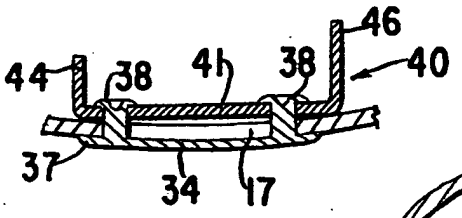
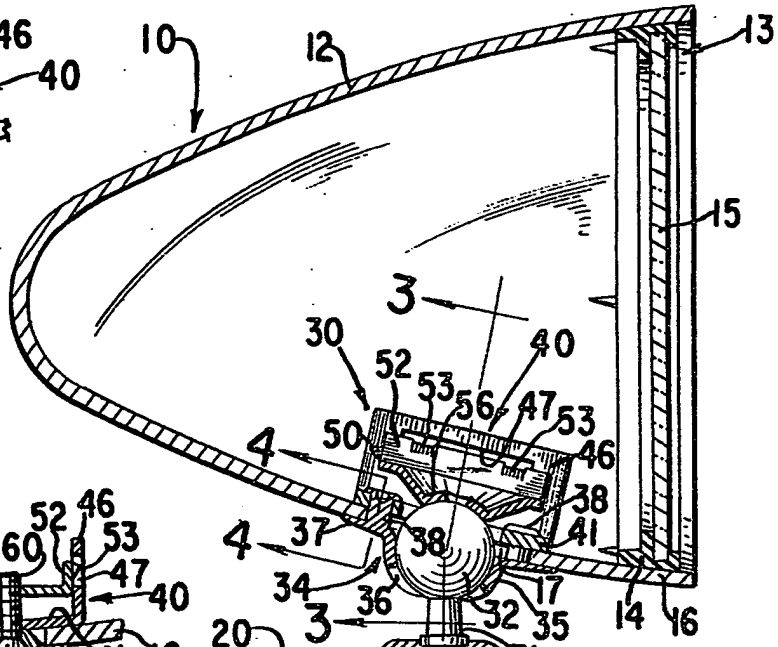


FIG. 4



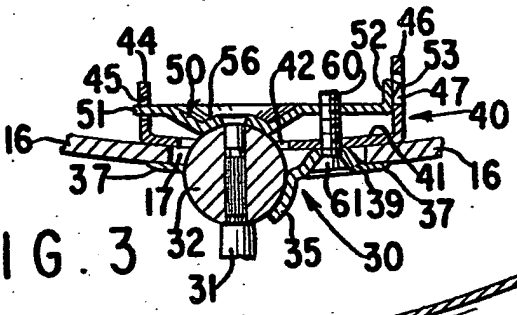


FIG. 3

FIG. 1

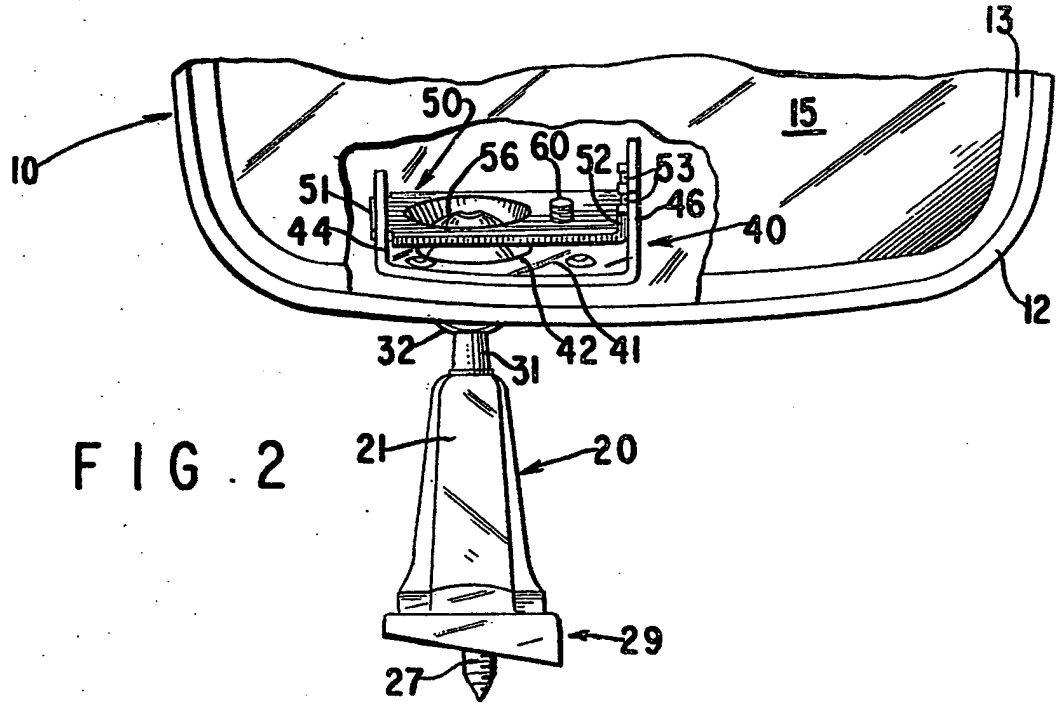


FIG. 2

MIRROR CLAMPING ASSEMBLY

This invention relates to a mirror clamping assembly and, more particularly, to a ball joint structure for clamping a rear view mirror head tightly yet turnably on a supporting ball member.

Automobiles usually have one or more external rear view mirrors mounted on the car body. Such mirrors are subject to adverse weather conditions, wind and vibrations. Each mirror typically is supported adjustably on a mounting device fixed to the car body. It is common to join the mirror head, or housing, to the mounting device by a swivel or ball joint so that the mirror can be set angularly to a position compatible with the field of vision of any driver.

It is important that the ball joint be one which will securely and tightly clamp the mirror housing in a desired position yet will keep the housing turnable whenever desired for adjusting the position of the mirror. Various structures have been proposed and/or used for this purpose, among which are those disclosed in U.S. Pat. Nos. 2,726,575, 2,789,464, 3,000,263, 3,191,498, 3,235,294, 3,338,545 and 3,603,555.

The known ball joint structures are disadvantageous in one or more several practical respects. Many of them require the mirror housing to be made with special formations serving as part of the ball joint, thus requiring a particular housing configuration. Some of them have no provision for adjusting the tension applied to the ball member of the joint; so the mirror head may become too loose or too tight, incorrectably, under various weather or other use conditions. Some of them include a tension adjustment screw that can be turned to tighten the ball joint but have parts of the joint so arranged that a part may be lost or will be difficult or impractical to re-assemble if the adjustment screw should loosen or fall off the structure due to vibration or other conditions encountered in the use of automobile mirrors.

It is the principal object of the present invention to provide an improved ball joint assembly for clamping a mirror head or housing on a supporting ball member, which requires no special housing formation other than an opening through the housing wall, provides for easy external adjustment of the tension applied to the ball of the supporting member, and has its parts so secured that they stay in assembled position even if a device for adjusting the tension should become loose or detached.

The clamping ball joint assembly of the invention holds a body such as a housing forming a mirror head tightly yet turnably positioned on a supporting member carrying a ball disposed in an opening formed through a wall of the body. The assembly includes a ball seat member that cradles the outer side of the ball and is fixed against the outer side of the body wall and a body clamp which is fixed against the inner side of the wall, together with a ball clamping member at said inner side and means adjustable from outside the body for holding this clamping member under a desired tension against the inner side of the ball. Co-acting means on the body clamp and the ball clamping member prevent displacement of the latter away from a position for engagement with the tensioning means and the ball.

In preferred embodiments of the invention, the body clamp comprises a substantially rigid bracket having upstanding leg portions extending from a base portion of the bracket at opposite sides of the wall opening in which the ball is disposed. A related ball clamping member comprises a substantially rigid yet resilient pressure plate having a portion thereof contoured to fit against the ball, with one end of this plate pivotably engaging one of the legs of the body clamp bracket and the opposite plate end engaged with the other bracket leg but displaceable relative to it for tensioning the plate in the direction toward the body wall. The adjustable means for holding the ball clamping member under tension comprise a screw that extends from a head outside the body wall through openings in the ball seat member and the base portion of the body clamp bracket and is threaded in an opening in the pressure plate at a location between the contoured portion and the displaceable end of this plate. The displaceable plate end is formed with a lip that protrudes laterally into a clearance opening formed in the adjacent bracket leg, so that the lip will butt against an upper margin of the clearance opening, thus limiting displacement of the pressure plate in the direction away from the ball, upon loosening or removal of the tensioning screw.

According to a further feature of the invention, the ball seat member and the base portion of the body clamp bracket are joined together against the opposite sides of portions of the body wall that border the wall opening in which the ball is disposed, thus tightly sandwiching these wall portions to provide a structurally integrated assembly. The seat member and bracket base preferably are so joined together by rivets which extend between them in corners of the wall opening. A single opening formed in the wall of a mirror housing suffices for assembling the housing with a supporting ball member according to this invention.

The above mentioned and other objects, feature and advantages of the invention will be further apparent from the following detailed description and the accompanying drawings of an illustrative embodiment of the invention. In the drawings:

FIG. 1 is a cross-sectional view of a rear view mirror assembly embodying a ball joint structure according to the invention;

FIG. 2 is a front elevational view, partly broken away, of the assembly shown in FIG. 1;

FIG. 3 is a cross-sectional view of the ball joining structure taken along line 3—3 in FIG. 1; and

FIG. 4 is a cross-sectional view of a portion of the structure, taken along line 4—4 in FIG. 1.

The mirror assembly shown in FIG. 1 includes a rear view mirror body or head 10 which is joined tightly yet turnably to a mirror mounting structure 20 by a ball joint and a clamping assembly generally indicated at 30.

The body or head 10 comprises a wall 12 formed to a desired housing configuration having an open side at 13 where it receives and holds securely a mirror frame 14 supporting a mirror glass 15. A lower portion 16 of wall 12 has an opening 17 formed through it to accommodate a supporting ball 32 and some other parts of the ball joint structure. The opening 17 may be simply a substantially rectangular, or square, opening cored or cut out of the body wall, which preferably is a molded plastic wall.

The mirror mounting structure 20 may be of any known form suitable for being fastened at a desired location onto a vehicle body and for securely holding a suitable mirror supporting ball member such as a stud 31 having the ball 32 fixed on its upper or free end. The illustrated mounting structure includes a mirror base 21 having a top portion 22 in which the stud 31 is fixed

lightly and having a body portion that covers and is fastened to an elongate mounting bracket 25. The mounting bracket 25 is centrally slotted at 26a and 26b to receive mounting screws 27. It comprises a bordering side flange 28 that is seated on an inner ledge of an elastic mounting pad 29. The mirror base 21 has a bordering side flange 23 seated on an outer ledge of the same mounting pad. The bracket 25 is first fastened onto the pad 29 and a vehicle body by engagement of the screws 27, and then the mirror base is placed over the bracket and is fastened to it by a screw 24 so that the base flange 23 presses the outer portion of the pad 29 against the surface to which the pad and bracket are mounted.

The ball joint and clamping assembly 30 comprises four principal parts in addition to the supporting ball member, namely: a ball seat member 34, a body clamping member 40, a ball clamping member 50 mounted on portions of member 40, and an adjustable tensioning screw 60.

The ball seat member 34 is a rigid piece formed with a spherically concave portion 35 to receive and cradle the outer side of the ball 32, and with substantially flat bordering portions 37 which bear and are fixed against the outer side of portions of the body wall at 16 that border the opening 17. The concave, ball cradling portion 35 has an opening 36 in its base through which the ball stud 31 extends to the mirror base top 22. The opening 36 is made large enough to accommodate the required angular adjustability of the mirror head relative to the stud 31.

The body clamping member 40 is formed to bear and be fixed against the inner side of portions of the body wall at 16 that border the wall opening 17. Member 40 in the form shown is a substantially rigid bracket having a base portion 41 extending to opposite sides of opening 17 and having legs 44 and 46 turned up from opposite ends of the base portion. An opening 42 in the base portion allows the inner side of the ball 32 seated in member 34 to protrude freely through the base portion for engagement by the ball clamping member 50.

In the present preferred embodiment, the ball seat member 34 and the base portion 41 of the body clamping member 40 are fixed against the outer and inner sides respectively of the body wall portions that border the opening 17, by being joined together with those wall portions sandwiched between them. Members 34 and 40 are so joined by rivets 38 which extend from member 34 through the opening 17 at corners of this opening and pass through and are headed over rivet openings formed in the base portion 41 of member 40. See FIG. 4.

The ball clamping member 50 in the illustrated embodiment is formed as a substantially rigid yet resilient pressure plate that extends and is supported between the upstanding legs 44 and 46 of the body clamping member 42. One end of the plate 50 is engaged pivotably with leg 44, as by being formed with a tongue 51 fitting into a slot 45 formed in that leg. The opposite end of the plate 50 is engaged loosely with the other leg 46 of the body clamp member, so as to be displaceable relative to leg 46 in the direction toward the base portion 41, i.e. toward the ball 32 and the bordering body wall at 16. For this purpose the plate 50 may be formed with an upturned end 52 from which a lip 53 is stuck out to protrude laterally into a clearance opening 47 formed in leg 46. The lip 53 has a limited range of free motion in the clearance opening 47. If the pressure plate, or ball clamping member, is not being held under tension the upper edge of lip 53 as seen in FIG. 3 will engage against the upper margin of the clearance opening 47 to limit displacement of the pressure plate 50 in the direction away from the body wall at 16. End 52 of plate 50 can be forced down into assembled position.

The pressure plate 50 is formed at a location between its ends with a portion 56 that is contoured to fit against the inner side of the ball 32. This contoured portion presents a spherically concave surface which is pressed against the ball surface, thus imposing frictional resistance against relative movement of the two surfaces, when the pressure plate is held in place under tension.

The pressure plate, or ball clamping member, has tension applied to it through the tensioning screw 60. The screw 60 has a head 61 to seat in a socket 39 formed in the ball seat member 34. The shank of the screw 60 extends through an opening in the socket and an aligned opening in base portion 41 of the body clamp 40, and then is threaded through an opening in the pressure plate 50 at a location between the contoured portion 56 and the upturned end 52 of this plate. The screw head 61 thus is located outside the body wall 16, where it is accessible for turning the screw and adjusting the tension applied through it to the pressure plate.

It will be apparent that a tightening of the screw 60 will draw the loose end of the pressure plate closer to the body clamp 40 and wall portion 16, thus increasing the pressure of the contoured portion 56 of plate 50 against the inner side of the ball 32 and consequently increasing the frictional resistance of the engaged plate and ball surfaces against movement of the mirror head 10 relative to the supporting ball member and the mirror base to which it is fixed.

In the event of the screw 60 becoming loose or falling out of the clamping assembly, which may occur as a consequence of tampering with the screw or of vibrations in the use of the rearview mirror assembly, the pressure of the ball clamping member 50 against the mirror supporting ball 32 will be reduced or may be lost altogether. Nonetheless, by virtue of the confinement of the lip 53 of plate 50 in the clearance opening 47 of leg 46, the ball clamping member is kept in a position for easy reengagement with a fitting tensioning screw 60.

It will be understood that the new features of the present invention, which are intended to be defined by the appended claims, may be embodied and utilized in forms and ways differing from those of the preferred embodiment illustrated in the drawings and described hereinabove.

I claim:

1. In a ball joint for holding a body such as a mirror housing positioned tightly yet turnably relative to a supporting member carrying a ball disposed in an opening through a wall of the body, a clamping assembly comprising:

a ball seat member cradling the outer side of said ball and fixed against the outer side of said wall about said opening;

a body clamp fixed against the inner side of said wall about said opening;

a ball clamping member at the inner side of said wall to bear against the inner side of said ball;

means including an element engageable with said clamp-member and adjustable from outside said wall for holding said ball clamping member under a desired tension against said ball;

and coacting means on said body clamp and said ball clamping member for preventing displacement of the latter away from a position for engagement with said holding element and said ball in the event of disengagement of said element from said clamping member.

2. A ball joint according to claim 1, said body clamp comprising a substantially rigid bracket having upstanding legs extending from a base portion thereof at opposite sides of said wall opening, said ball clamping member comprising a substantially rigid yet resilient pressure plate having a portion thereof contoured to fit against said ball, having one end thereof engaged with one of said legs and having the opposite end thereof engaged loosely with the other of said legs so as to be displaceable relative thereto in the direction toward said wall.

3. A ball joint according to claim 2, said holding means comprising a tensioning screw having its head outside said wall, said screw extending through openings in said seat member and said base portion and being threaded in an opening in said plate at a location between said contoured portion and said displaceable end of said plate.

4. A ball joint according to claim 2 or claim 3, said coacting means comprising a clearance opening in said other leg and a lip on said displaceable end that protrudes laterally into said clearance opening and will engage an upper margin thereof to limit displacement of said plate in the direction away from said wall.

5. A ball joint according to claim 2 or claim 3, said ball seat member and said base portion of said bracket being joined together against the opposite sides of portions of said wall bordering said wall opening.

6. A ball joint according to claim 5, said seat member and said base portion being so joined by rivets extending between them in corners of said wall opening.

7. In a rear view mirror assembly comprising a wall forming a mirror head, a mirror mounted in said head, said wall having an opening therein to receive a supporting ball, mirror mounting means including a mounting bracket, a stud support on said bracket, a ball stud fixed to said support and carrying a ball disposed in said wall opening, and means for clamping said mirror head tightly yet turnably on said ball, the improvement wherein said clamping means comprises:

a ball seat member cradling the outer side of said ball and fixed against the outer side of said wall about said opening;

a body clamp fixed against the inner side of said wall about said opening;

a ball clamping member at the inner side of said wall to bear against the inner side of said ball,

means adjustable from outside said wall for holding said clamping member under a desired tension against said ball;

and coacting means on said body clamp and said clamping member for preventing displacement of the latter away from a position for engagement with said holding means and said ball;

said body clamp comprising a substantially rigid bracket having upstanding legs extending from a base portion thereof at opposite sides of said wall opening;

said ball clamping member comprising a substantially rigid yet resilient pressure plate having a portion thereof contoured to fit against said ball, having one end thereof pivotably engaged with one of said legs and having the opposite end thereof engaged loosely with the other of said legs so as to be displaceable relative thereto in the direction toward said wall;

said holding means comprising a tensioning screw having its head outside said wall, said screw extending through openings in said seat member and said base portion and being threaded in an opening in said plate at a location between said contoured portion and said displaceable end of said plate;

said coacting means comprising a clearance opening in said other leg and a lip on said displaceable end that protrudes laterally into said clearance opening and will engage an upper margin thereof to limit displacement of said plate in the direction away from said wall.

8. A mirror assembly according to claim 7, said ball seat member and said base portion of said bracket being joined together against the opposite sides of portions of said wall that border said wall opening by rivets extending between them in corners of said wall opening.

* * * * *

Evidence Appendix

United States Patent [19]

Stern

[11] **3,741,632**

[45] **June 26, 1973**

[54] **ANTIGLARE MIRROR WITH ONE REFLECTING FACE FORMED OF AN ARRAY OF PRISMS**

[75] Inventor: **David Stern, Windsor, Berkshire, England**

[73] Assignee: **Combined Optical Industries, Limited, Slough, Buckinghamshire, England**

[22] Filed: **Jan. 12, 1971**

[21] Appl. No.: **105,900**

[30] **Foreign Application Priority Data**

Jan. 23, 1970 Great Britain 3,435/70

[52] **U.S. Cl.** **350/281**, 350/211, 350/292

[51] **Int. Cl.** **B60r 1/04**, G02b 5/08

[58] **Field of Search** 350/279–281, 286, 204, 211, 292

[56] **References Cited**

UNITED STATES PATENTS

3,561,848	2/1971	Cunningham	350/281
2,953,062	9/1960	Ford	350/286
3,254,556	6/1966	Staunton	350/168
3,293,982	12/1966	Appeldorn	350/211 UX

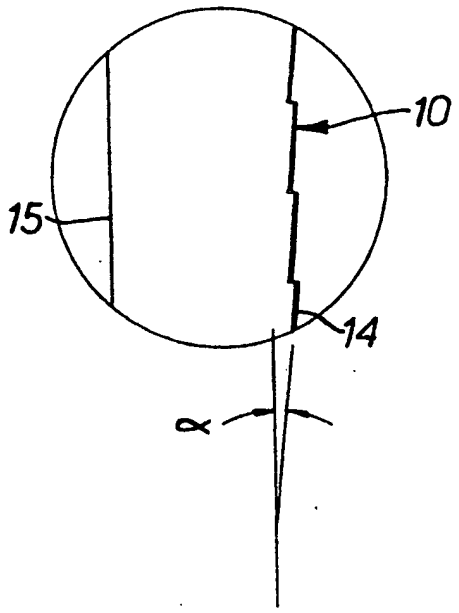
Primary Examiner—John K. Corbin

Attorney—Shoemaker & Mattare

[57] **ABSTRACT**

A method of making a mirror in which a body is moulded of transparent synthetic plastics material, the body having a plain face and a face equispaced therefrom and including linear prisms integral therewith, the prisms together forming a surface which will reflect incident light received from one direction in a common direction different from that in which the plain surface will reflect that incident light and with a reflective power different from that of the plain surface.

7 Claims, 3 Drawing Figures



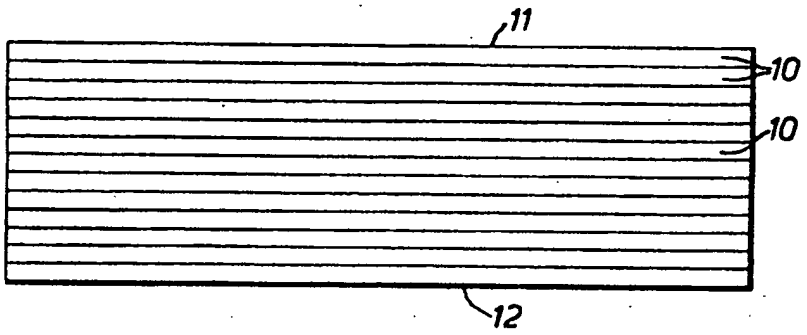


FIG. 1.

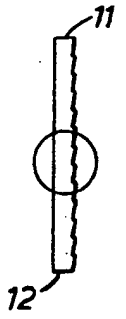


FIG. 2.

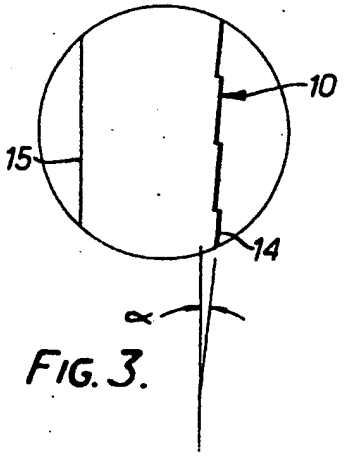


FIG. 3.

INVENTOR
DAVID STERN
BY
Shoemaker and Mattare
ATTORNEYS

ANTIGLARE MIRROR WITH ONE REFLECTING FACE FORMED OF AN ARRAY OF PRISMS

This invention is concerned with improvements in and relating to mirrors and methods of making mirrors.

It is known to provide rear view mirrors for motor vehicles which have a front reflective surface and a rear reflective surface at an angle to the front reflective surface, the surfaces having different reflective characteristics so that with the mirror in one attitude the driver may obtain a reflection in day time from one surface of a first intensity and with the mirror in another attitude he will obtain a reflection of a lower intensity of strong light, such as headlights of a following vehicle.

Such mirrors have been manufactured of glass, as have the conventional planar mirrors, because of the low cost of glass. However the production of glass pieces with non-parallel surfaces requires machining of individual pieces.

According to the present invention there is provided a rear view mirror comprising a moulding of transparent synthetic plastic material having one plain reflective surface with a low reflective power and another reflective surface spaced generally equidistant therefrom and having a high reflective power, that other surface having integral therewith linear prisms which together will reflect light incident from one direction in a common direction, different from that in which the plain surface will reflect such incident light, the reflective power of the plain surface and the prisms being different to give a mirror of variable reflective power.

The plain surface may be planar or curved and the surface formed of linear prisms preferably is silvered with any suitable metal. Where the plain surface is curved whether in one or two dimensions the prisms will follow the contours of the or each curvature of the plain surface.

In order that the invention may be well understood there will now be described an embodiment thereof, given by way of example only, reference being had to the accompanying drawing in which:

FIG. 1 is a rear view of a day and night mirror for use in a motor vehicle;

FIG. 2 is an end view of the mirror shown in FIG. 1 with the thickness illustrated on an exaggerated scale; and

FIG. 3 is a detail of part of FIG. 2.

As shown in FIG. 1 a generally rectangular mirror, for arrangement as the rear view mirror of a motor vehicle, has a plain surface and a second surface equispaced therefrom and including an array of linear prisms extending there across. The linear prisms are here designated 10, and their disposition on the rear surface of the mirror can be seen in FIG. 2.

The actual shape of the prisms is best seen in FIG. 3 which shows that for a planar mirror mounted near the top of the windscreen of a motor car, there is in practice only a small angle alpha of the order of 3¼° between the reflective surface 14, of the linear prisms, and a plane parallel with the plain surface 15 of the mirror. This angle may however be as high as 10° for other applications. It is preferred that the outstanding angle of the prisms should be 90° and that there should be 10 to 20 prisms to the inch.

In use the mirror may be installed in a day and night mirror arrangement, for a motor car, wherein the angle of the mirror may be altered so that incident light from behind the car is reflected either from the plain frontal surface at night, or from the further surface having the array of prisms during day time use. The plain surface will have a reflective power of the order of 5 percent to 45 percent and the prismatic surface a reflective power of the order of 55 percent or better. These figures being dependent on various factors such as materials used and local legislation. It will be understood that the mounting of the mirror has an arrangement whereby the angle of the mirror may be altered relative to the position of the driver.

The mirror as described is made by moulding transparent synthetic plastics material preferably methacrylate such as DIAKON or PLEXIGLASS. A mould is used which has the linear prisms formation established therein by any of the usual mould making techniques. The frontal surface may be coated with an abrasion resistant layer lacquer while the surface having an array of prisms is silvered, preferably by vacuum deposition of aluminum, and constitutes the side of the mirror which will be remote from the incident light. Thus any dust accumulating on the inset angles of the prisms will not effect the use of the mirror.

The mirror and its method of manufacture described above by way of example has the advantage that the overall thickness of the mirror does not vary between the top and bottom surfaces 11 and 12 respectively. This permits accurate moulding, gives good optical qualities to the mirror and enables mirrors to be made from a single moulding all of which will be of the same dimensions, whereas previously known mirrors with divergent surfaces could only be formed in multiples and then cut if the units were end to end. Because of the wedge shape two units could not be formed one above another because the top of one would be thicker than the bottom of the one above. The mirror may be moulded as a planar mirror or as a mirror curved in one or two directions, in the latter cases the prisms follow the contour or contours of the front surface. A day and night mirror is provided which is much cheaper due to the moulding technique, than any thing obtainable with similar optical qualities from glass.

I claim:

1. An antiglare rear view mirror comprising a moulding of transparent synthetic plastics material having a plain reflective surface which reflects light incident thereon from one direction in a first direction and having a low reflective power, a second reflective surface thereon spaced generally equidistant from the first reflective surface, said second reflective surface having integral therewith linear prisms which together reflect light incident from said one direction in a second direction different from that in which the plain surface reflects such incident light and having a high reflective power, the different reflective powers of the plain surface and of the prisms obtaining a reflection in daytime of a first intensity from the prisms, and a reflection in nighttime of a lower intensity from the plain surface to reduce the glare of headlights and the like.

2. An antiglare mirror according to claim 1, in which the synthetic plastics material is a methacrylate.

3. An antiglare mirror according to claim 1, in which the prism surface carries a reflective metallic coating.

4. An antiglare mirror according to claim 1, in which the prism reflective surfaces are at an angle of 3¼° to 10°.

5. An antiglare mirror according to claim 1, in which there are between 10 and 20 prisms to the inch.

6. An antiglare mirror according to claim 1, in which the plain surface has a reflective power between 5 percent to 45 percent and the prisms have a reflective power of at least 55 percent.

7. An antiglare mirror according to claim 1, in which the plain surface is curved in at least one direction and the prisms follow the curvature of the plain surface.

* * * * *

Evidence Appendix

United States Patent [19]

Manzoni

[11] **Patent Number: 4,558,840**

[45] **Date of Patent: Dec. 17, 1985**

[54] **DEVICE FOR MOUNTING A REARVIEW MIRROR CASING ON A SUPPORT MEMBER**

[75] Inventor: **Stephane Manzoni, Saint-Claude, France**

[73] Assignee: **Societe Manzoni-Bouchot, France**

[21] Appl. No.: **354,107**

[22] Filed: **Mar. 2, 1982**

[30] **Foreign Application Priority Data**

Mar. 10, 1981 [FR] France 81 04764

[51] **Int. Cl.**[4] **A47B 97/04**

[52] **U.S. Cl.** **248/549**; 74/491; 248/484; 248/900; 350/635

[58] **Field of Search** ..... 248/549, 487, 481, 484, 248/900; 74/501 M, 491; 350/307; 403/70, 131, 125, 124

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,157,613	5/1939	Hodny	403/70
2,565,012	8/1951	Barrett	248/900
2,885,235	5/1959	Moskovitz	403/131
2,919,599	1/1960	Milton et al.	74/491
2,962,933	12/1960	Hezler	74/501 M
3,250,555	5/1966	Wehner	403/125
3,313,077	4/1967	Fuqua	74/501 M
3,348,425	10/1967	Van Noord	74/501 M
3,474,686	10/1969	Liedel	74/501 M
3,552,229	1/1971	Cummins et al.	74/501 M
3,887,156	6/1975	Hugonnier	248/549
4,213,675	7/1980	Pilhall	74/491
4,218,036	8/1980	Pitkanen	248/900
4,218,037	8/1980	Palamountain	350/307
4,357,076	11/1982	Manzoni	350/307
4,422,724	12/1983	Otsuka et al.	350/307
4,464,016	8/1984	Weber et al.	248/900
4,464,017	8/1984	Wada	248/900
4,464,594	8/1984	Sharp	248/900

FOREIGN PATENT DOCUMENTS

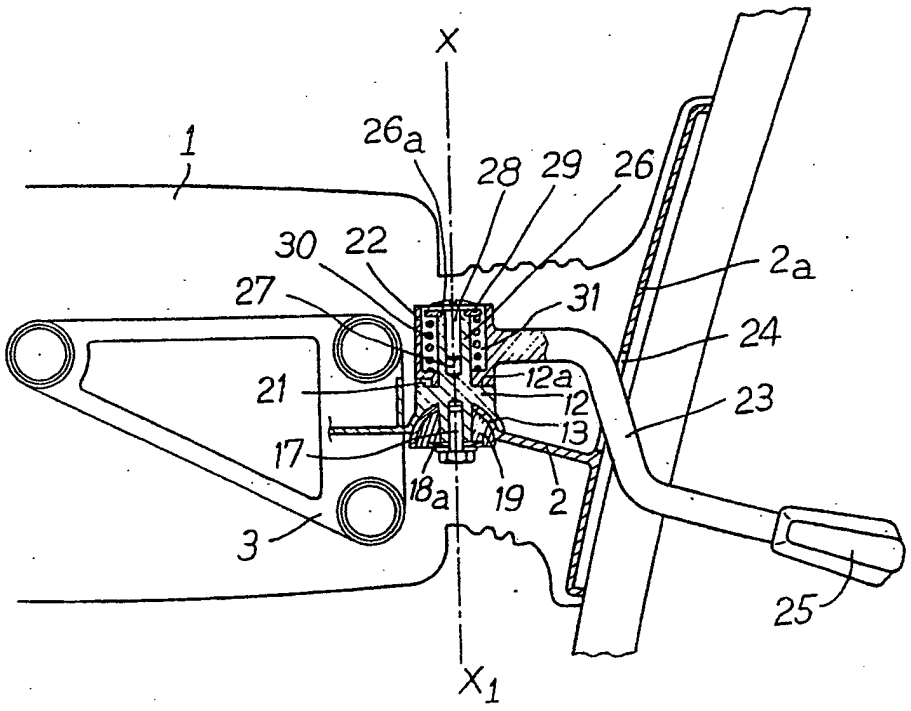
1000350	8/1965	United Kingdom	248/900

Primary Examiner—Ramon S. Britts
Assistant Examiner—Ramon O. Ramirez
Attorney, Agent, or Firm—Remy J. VanOphem

[57] **ABSTRACT**

A mounting for joining a mirror casing to a support member. The support member is attached to a vehicle body panel or gusset. An intermediate member secured to the mirror casing is connected to the support member by a single joint which is adjustable and which yields upon impact to the mirror casing. In one embodiment, a control lever may be used to rotate the mirror from inside the vehicle. The control lever is connected to the intermediate member by a releasable pivot joint to allow the mirror casing to pivot relative to the control lever upon impact.

7 Claims, 8 Drawing Figures



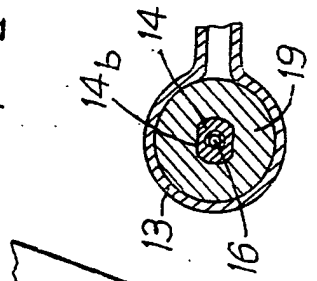


FIG. 2a

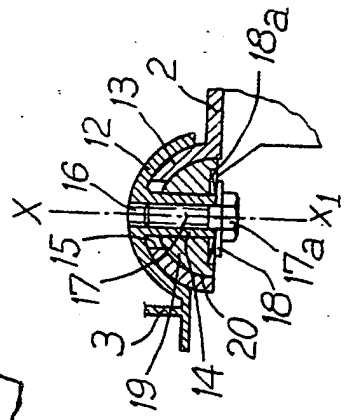


FIG. 2

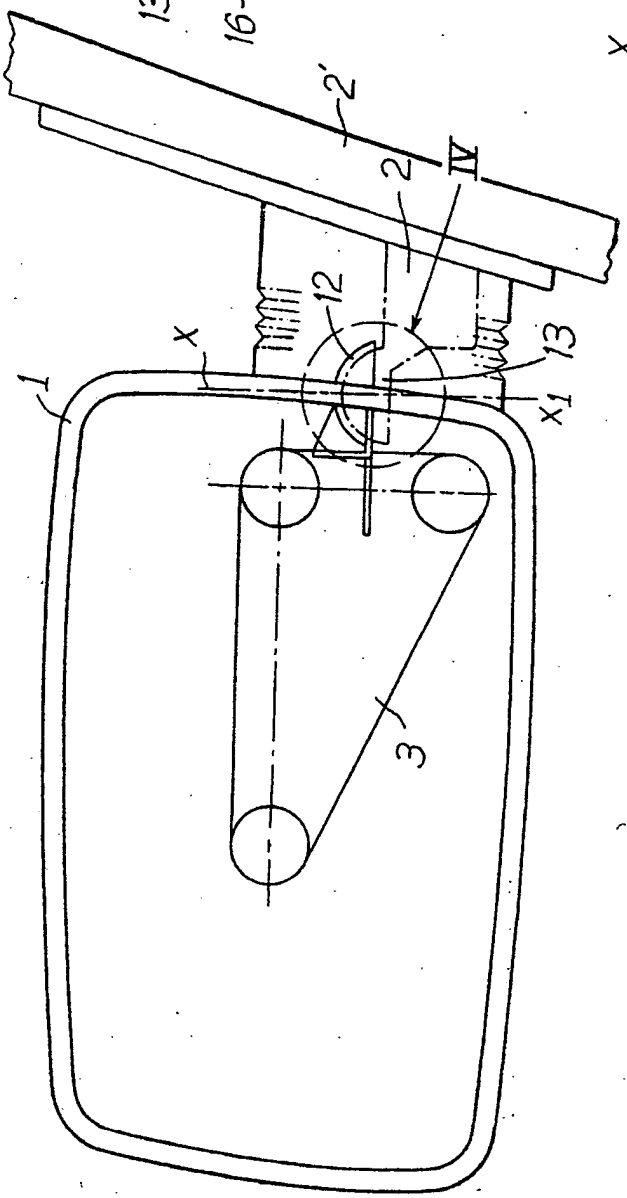
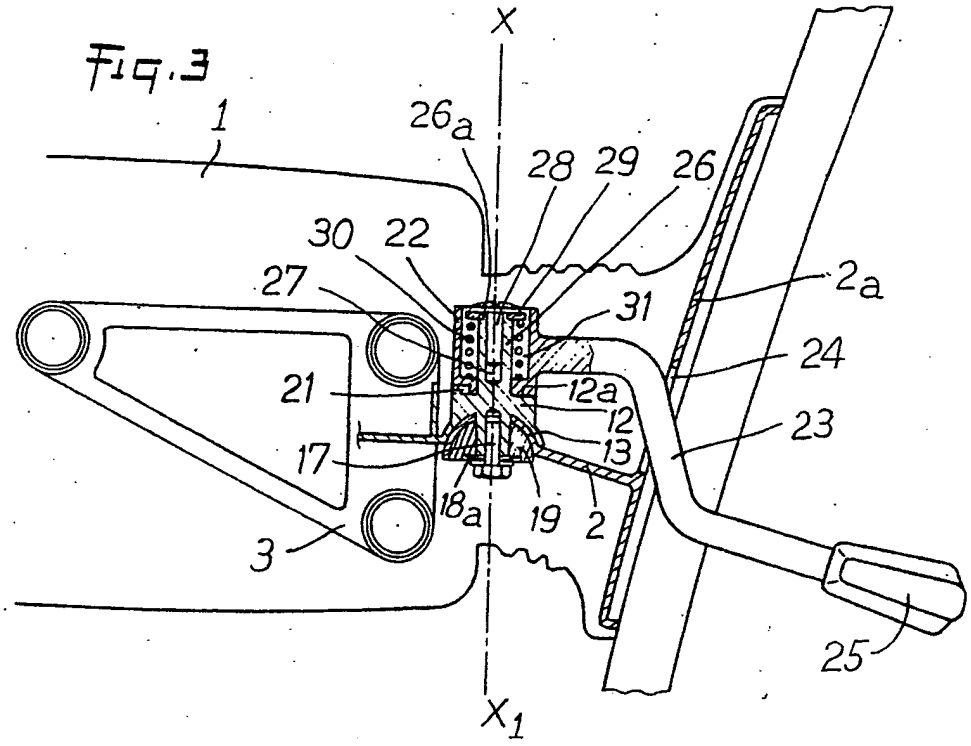


FIG. 1

Fig. 3


X
1
26a
28
29
26
30
22
27
31
2a
24
21
12a
12
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17
13
18a
19
2
3
25
X1

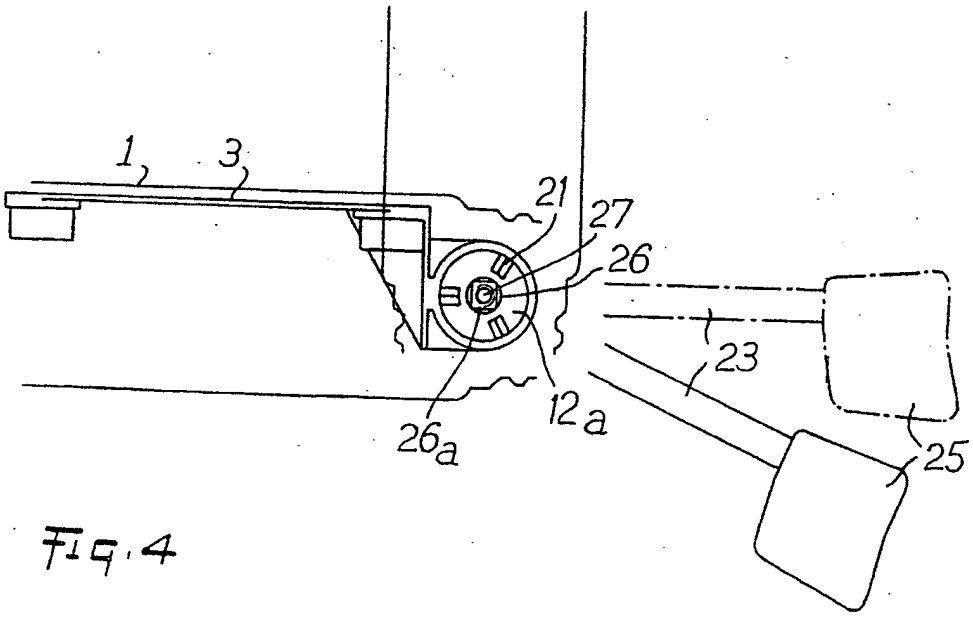

1
3
21
27
26
23
12a
26a
25

Fig. 4

Fig. 5

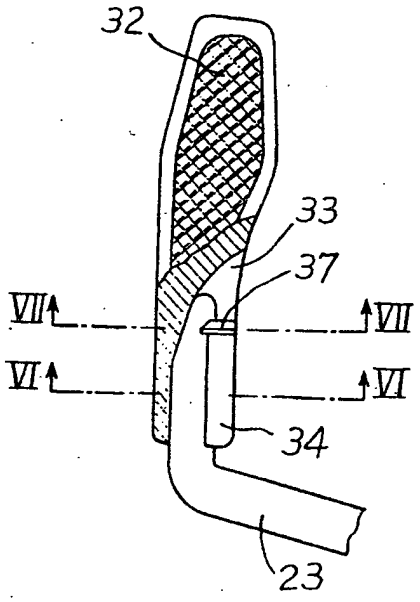


Fig. 6

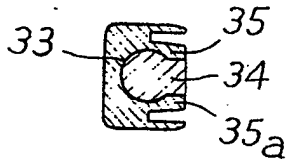
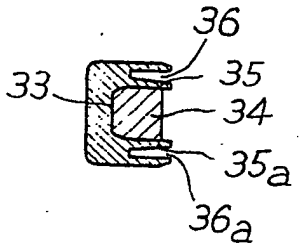


Fig. 7



DEVICE FOR MOUNTING A REARVIEW MIRROR CASING ON A SUPPORT MEMBER

BACKGROUND OF THE INVENTION

The present invention relates to a device for mounting a rearview mirror casing on a support member.

To insure the connection between the casing of a rearview mirror and a support member secured to the car door or to the bodywork of the vehicle, it is general practice to use an intermediate member which is secured to the bottom of the casing and which provides a connection for pivotally fixing the casing to the support member.

In the currently known devices, the pivoting, connecting axis is situated on a lug at the lower part of the intermediate member.

The existing arrangement is suitable for mounting a rearview mirror to the panel of a vehicle door but cannot be functionally adapted to the mounting of a rearview mirror to the gusset of a vehicle door.

SUMMARY OF THE INVENTION

According to the present invention, the vertical axis about which the casing pivots in the event of impact is situated in the wall of the casing outside of the bodywork.

Also according to the invention, the intermediate member incorporates on one of its edges, a cup-shaped member presenting a concave bearing surface which rests against a swivel portion integral with the support member. The cup-shaped member is joined to the swivel portion by means of a cross-piece.

The connection between the support member and the intermediate member allows an angular movement which is necessary for the manual adjustment of the rearview mirror casing.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood by reading the following description with reference to the accompanying drawings in which:

FIG. 1 is an elevational view of a rearview mirror casing mounted on a support member;

FIG. 2 is a detailed view of an axial cross-section of an embodiment of the hinged connection;

FIG. 2*a* is a cross-sectional view of the hinged connection;

FIG. 3 is an elevational view of a cross-section of another embodiment of the rearview mirror according to the invention;

FIG. 4 is a partial plan view of the rearview mirror shown in FIG. 3;

FIG. 5 is an elevational view of a partial cross-section of a system for fastening a control knob on a control lever;

FIG. 6 is a cross-sectional view along line VI—VI of FIG. 5; and

FIG. 7 is a cross-sectional view along line VII—VII of FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a rearview mirror casing 1, made in this example, of plastic material, which is mounted on a support member or base 2 by way of an intermediate member 3 which consists of a metal plate secured on the base of the casing 1.

The support member 2 is secured in a known manner to the vehicle body panel or gusset 2' of the car door adjacent the window.

On one of the edges of the intermediate member 3, there is provided a concave or cup-shaped member 12, shown in FIG. 2 presenting a concave bearing surface resting against a swivel or concave portion 13 which is integral with the support member 2. The cup-shaped member 12, as shown on FIG. 2, includes a tubular portion 14 extending inside the swivel portion 13 through an opening 15 permitting a spring movement of the tubular portion 14 in all directions. The tubular portion 14 has a flat 14*b*, more clearly shown in FIG. 2*a*, which is provided with a tapped hole for a screw 17. Underneath, the head 17*a* of the screw 17 rests on a washer 18 which compresses an elastic ring 18*a* against a cross-piece 19 which surrounds the tubular portion 14 and engages the flat 14*b* and which has a spherical bearing surface 20 of metal or plastic.

It is possible with this particular arrangement to produce a swivel connection with an angular spring movement which provides the ability to adjust the rearview mirror casing manually.

According to the invention, the vertical pivoting axis XX_1 of the casing 1 on the support member 2 is situated at the wall of the casing 1 and outside of the bodywork.

FIGS. 3 and 4 show another embodiment in which the cup-shaped member 12 has an upper part which presents a plane face 12*a* provided with lugs 21 which cooperate with corresponding housings provided in a tubular member 22 which is integral with a control lever 23. The control lever 23 extends into the inside of the vehicle through an orifice 24 provided in the support member portion 2*a*. The inside end of the control lever 23 is provided with a control knob 25.

The tubular member 22 is mounted to pivot on a rod 26 which extends upwardly from the cup-shaped member 12. The rod has a tapped hole 27 for a screw 28. Under the head of the screw 28 rests a washer 29 which compresses a helical spring 30 against the bottom of the housing 31 of the tubular member 22.

The rod 26 is provided at its upper pair with the male square 26*a* which engages the square opening of a washer 29. This prevents rotation of the washer and the loosening of the screw 28 when the control lever 23 is actuated.

This particular arrangement makes it possible to actuate the rearview mirror by means of the control lever 23 which moves the tubular member 2. The movement of the tubular member 22 is transmitted to the cup-shaped member 12 and the intermediate member 3, because the helical spring 30 holds the lugs 21 of the cup-shaped member in engagement with the corresponding housings of the tubular member 22.

On the other hand, if the rearview mirror casing 1 is subjected to an impact, it can pivot about the axis XX_1 because the helical spring 30, which is compressed under a predetermined pressure, can release the lugs 21 from their housings and allow rotation of the mirror casing 1 with respect to the control lever 23 and the support member 2.

FIGS. 5, 6 and 7 show an embodiment of an operating knob 32 of deformable plastic material in the form of a housing 33 with an opening in which is mounted the end of the control lever 23. The operating knob 32 has a boss 34 of rectangular cross-section.

Walls 35, 35*a* of the housing 33 surround the opening and are in contact with the boss 34. The walls 35 and 35*a* are reduced in cross-section by two slits 36 and 36*a* which make the walls 35 and 35*a* deformable in order to allow detachment of the end of the lever 23 from the operating knob 32 in case of impact.

A tooth 37 is provided at the upper part of the boss 34 to control the position of boss 34 within the walls 35 and 35*a*.

The invention is in no way limited to the description given hereinabove and on the contrary covers any modifications that can be made thereto without departing from the scope thereof.

What is claimed is:

1. A mirror mounting device for pivoting a mirror casing relative to a vehicle body gusset upon impact thereof, said mirror mounting device comprising:

a support member mounted to said vehicle body gusset;

an intermediate member mounted to said mirror casing; and

means for mounting said intermediate member to said support member, said mounting means comprising:

means for pivoting said mirror casing and intermediate member relative to said support member and vehicle body gusset; and

means for selectively adjusting said mirror casing relative to said vehicle body gusset whereby said selectively adjusting means permits selective manual adjustment of said mirror while said pivoting means permits pivoting of said mirror casing relative to said vehicle body gusset upon impact thereof.

2. A mirror mounting device as claimed in claim 1 wherein said means for mounting said intermediate member to said support member comprises:

a concave portion extending from said support member;

a concave member attached to said intermediate member, said concave member having an inner surface, an outer surface and a central axis, said inner surface of said concave member slidably engaging said concave portion of said support member; and

means for biasing said concave member to said concave portion, said biasing means slidably biasing said concave member into engagement with said concave portion so that said mirror casing is selectively movable relative to said support member.

3. A mirror mounting device for mounting a mirror casing to a vehicle body gusset of a vehicle, said mirror mounting device comprising:

a support member having a first end and a second opposite end, said first end being mounted to said vehicle body gusset, said second opposite end comprising a concave portion, said concave portion comprising a hole, said hole having a predetermined inner diameter;

an intermediate member mounted to said mirror casing;

a concave member attached to said intermediate member, said concave member having an inner surface, an outer surface and a central axis, said concave member further having a tubular portion extending from said inner surface, said tubular portion being disposed concentric with said central axis, said tubular portion having a threaded internal bore, said tubular portion further having a predetermined partial outer diameter and at least one flat external surface, said inner surface of said concave member slidingly engaging said concave portion, said tubular portion extending through said hole in said concave portion, said predetermined partial outer diameter of said tubular portion being smaller than said predetermined inner diameter of said hole whereby said concave member can move relative to said concave portion;

a cross-piece member inserted in said concave portion, said cross-piece member comprising an annular body, said annular body comprising a rounded upper surface and a flat lower surface, said rounded upper surface engaging said concave portion, said annular body further comprising an inner surface surrounding said tubular portion, said inner surface comprising at least one flat portion, said at least one flat portion engaging said at least one flat external surface of said tubular portion;

a resilient annular washer abutting said flat surface of said cross-piece member;

a first threaded fastening means inserted through said resilient annular washer, said first threaded fastening means being threadably inserted into said threaded bore of said tubular portion whereby said resilient annular washer biases said concave member and said concave portion into engagement;

a face portion on said outer surface of said concave member, said face portion comprising a plurality of lugs and a rod member, said rod member having a threaded bore;

a tubular member mounted to said rod member and abutting said face portion, said tubular member having an inner bore concentric with said rod member, said tubular member further having a housing end, said housing end selectively engaging said plurality of lugs;

a control lever attached to said tubular member for manually moving said tubular member;

a second threaded fastening means threadably inserted into said threaded bore of said rod member; and

a helical spring located in said inner bore of said tubular member, said helical spring further being interposed said second threaded fastening means in said housing end, said helical spring biasing said housing end into engagement with said plurality of lugs so that manual movement of said tubular member by said control lever selectively adjusts said mirror casing relative to said vehicle body gusset and whereby said housing end can slip relative to said plurality of lugs to permit pivoting of said mirror casing relative to said control lever and said vehicle body gusset upon impact to said mirror casing.

4. A mirror mounting device for pivoting a mirror casing relative to a vehicle body gusset upon impact thereof, said mirror mounting device comprising:

a support member mounted to said vehicle body gusset;

an intermediate member mounted to said mirror casing; and

means for mounting said intermediate member to said support member, said mounting means comprising:

means for pivoting said mirror casing and intermediate member relative to said support member and vehicle body gusset;

means for selectively adjusting said mirror casing relative to said vehicle body gusset whereby said selectively adjusting means permits selective manual adjustment of said mirror while said pivoting means permits pivoting of said mirror casing relative to said vehicle body gusset upon impact thereof;

a concave portion extending from said support member;

a concave member attached to said intermediate member, said concave member having an inner surface, an outer surface and a central axis, said inner surface of said concave member slidably engaging said concave portion of said support member;

a wall portion integral with said concave portion, said wall portion having a hole therethrough;

a tubular portion projecting from said inner surface of said concave member, said tubular portion disposed concentric with said central axis of said concave member, said tubular portion having at least one flat outer surface and a threaded internal bore, said tubular portion further extending through said hole in said wall portion; and

a cross-piece member interposed said tubular portion and said concave portion, said cross-piece member having a central passage, and at least one flat inner surface along said central passage, said cross-piece member mounted to said tubular portion with said at least one flat inner surface of said central passage engaging said at least one flat outer surface of said tubular portion so that said tubular portion and said cross-piece member rotate and pivot together.

5. A mirror mounting device as claimed in claim 4 wherein said biasing means further comprises:

a resilient annular washer abutting said cross-piece member, said resilient annular washer having a central opening; and

a threaded fastening means inserted through said central opening of said resilient annular washer, said threaded fastening means being threadably inserted into said threaded internal bore of said tubular portion whereby said resilient annular washer biases said concave portion and said concave member into engagement.

6. A mirror mounting device for pivoting a mirror casing relatively to a vehicle body gusset upon impact thereof, said mirror mounting device comprising:

a support member mounted to said vehicle body gusset;

an intermediate member mounted to said mirror casing; and

means for mounting said intermediate member to said support member, said mounting means comprising:

means for pivoting said mirror casing and intermediate member relative to said support member and vehicle body gusset;

means for selectively adjusting said mirror casing relative to said vehicle body gusset whereby said selectively adjusting means permits selective manual adjustment of said mirror while said pivoting means permits pivoting of said mirror casing relative to said vehicle body gusset upon impact thereof;

a concave portion extending from said support member;

a concave member attached to said intermediate member, said concave member having an inner surface, an outer surface and a central axis, said inner surface of said concave member slidably engaging said concave portion of said support member;

means for biasing said concave member to said concave portion, said biasing means slidably biasing said concave member into engagement with said concave portion so that said mirror casing is selectively movable relative to said support member;

a face portion on said outer surface of said concave member;

a rod member extending from said face portion, said rod member having a threaded bore therein;

a plurality of lugs attached to said face portion;

a tubular member mounted to said rod member and abutting said face portion, said tubular member having an inner bore concentric with said rod member, said tubular member further having a housing end for selectively engaging said plurality of lugs;

a control lever attached to said tubular member, said control lever having a first end and a second opposite end, said first end of said control lever being attached to said tubular member;

a threaded fastening means threadably inserted in said threaded bore of said rod member; and

a spring located in said inner bore of said tubular member, said spring further being interposed said threaded fastening means and said housing end, said spring biasing said housing end of said tubular member and said plurality of lugs on said face portion of said concave member into engagement so that manual movement of said control lever selectively adjusts said mirror casing relative to said vehicle body gusset and whereby said housing end can slip relative to said plurality of lugs to permit pivoting of said mirror casing relative to said control lever and said vehicle body gusset upon impact to said mirror casing.

7. A mirror mounting device as claimed in claim 6 wherein said control lever further comprises:

a boss integral with said second end of said control lever; and

a knob member having a cavity and resilient walls surrounding said cavity, said boss being removably inserted into said cavity, said resilient walls biasing said boss to retain said knob member on said boss such that said knob member separates from said control lever upon impact against said knob member.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,558,840

DATED : December 17, 1985

INVENTOR(S) : Stephane Manzoni

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 44, delete "pair" and insert ---- part ----.

Column 2, line 45, delete "a" and insert ---- the ----.

Column 2, line 51, delete "2" and insert ---- 22 ----.

In the Claims

Column 5, line 47, delete "relatively" and insert ---- relative ----.

In the Drawings

Figure 3 should appear as shown on the attached sheet.

Signed and Sealed this

Seventeenth Day of *June 1986*

[SEAL]

Attest:

Attesting Officer

DONALD J. QUIGG

Commissioner of Patents and Trademarks

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

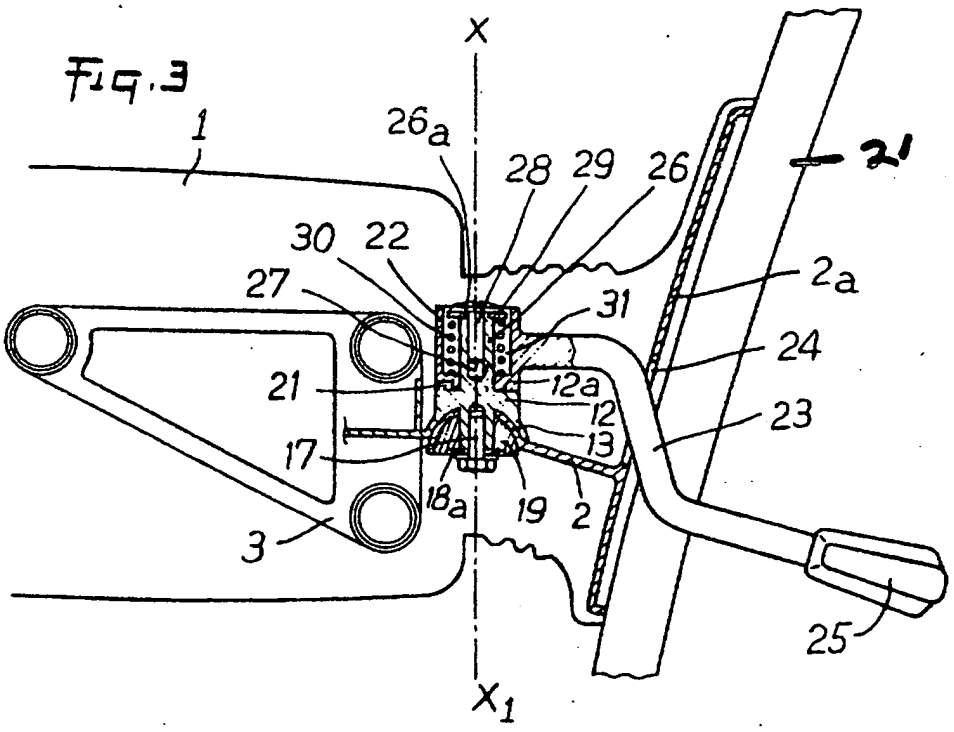
PATENT NO. : 4,558,840

DATED : December 17, 1985

INVENTOR(S) : Stephane Manzoni

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Fig. 3



Evidence Appendix

United States Patent [19]

Bury et al.

[11] **3,928,894**

[45] **Dec. 30, 1975**

[54] ADHESIVE MOUNTING DEVICE

[75] Inventors: **George John Bury**, Lake Villa; **Edwin Grant Swick**, Bartlett, both of Ill.

[73] Assignee: **Illinois Tool Works Inc.**, Chicago, Ill.

[22] Filed: **Nov. 26, 1974**

[21] Appl. No.: **527,331**

[52] **U.S. Cl.** ..... **24/73 VA**; 248/224

[51] **Int. Cl.²** **A44B 21/00**; A47G 1/16

[58] **Field of Search** ..... 248/467, 475 R, 475 B, 248/495, 223, 224; 24/73 VA, 73 RM, 73 MF

[56] **References Cited**

UNITED STATES PATENTS

1,030,090	6/1912	Johnson	248/224 UX
1,720,309	7/1929	Wakefield	248/224 X
1,794,700	3/1931	McCaskey	248/224
2,200,158	5/1940	Clarke	248/224 X
2,239,978	4/1941	Sanford	248/224
2,742,984	4/1956	Bedford	24/73 MF X
2,771,263	11/1956	Boho	248/224 X
3,074,680	1/1963	Stewart	248/224 X
3,131,251	4/1964	Ryan	248/475 R X
3,189,187	6/1965	Guyer et al.	248/223 X
3,848,843	11/1974	Levy	248/224

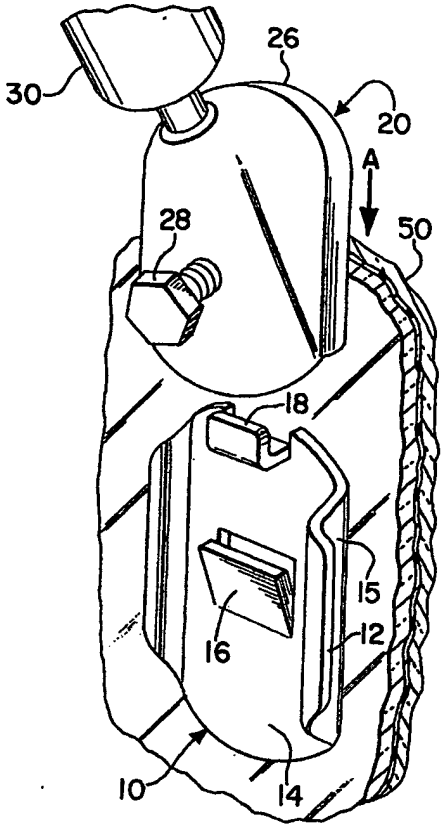
Primary Examiner—Donald A. Griffin

Attorney, Agent, or Firm—Robert W. Beart; Thomas W. Buckman

[57] **ABSTRACT**

A clip and mounting system utilizing such a clip designed to adhesively mount devices to a surface, such as a windshield. The system includes a mounting member adapted to be slid over and clamped to a base plate member which is bonded to the surface. The system includes spring means which permits differential expansion between the members without significantly altering the clamping load between the members and the stress on the adhesive bond.

11 Claims, 11 Drawing Figures



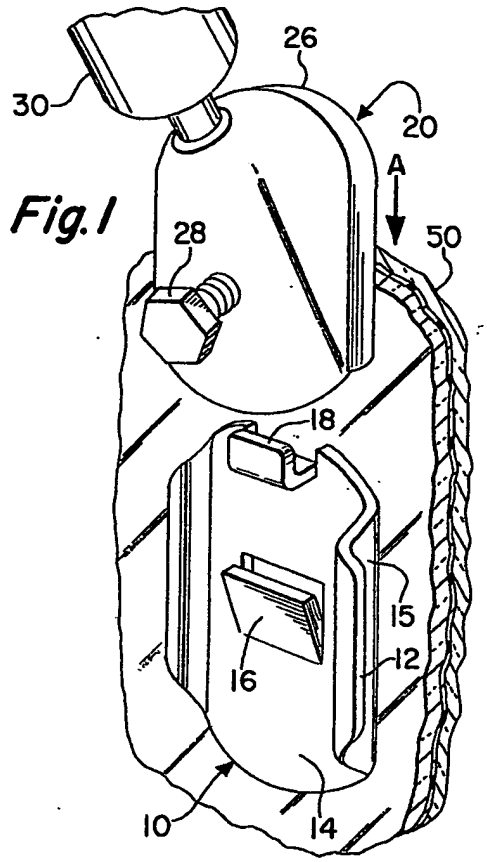


Fig.1

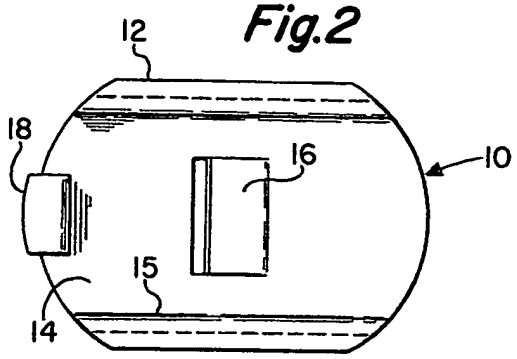


Fig.2

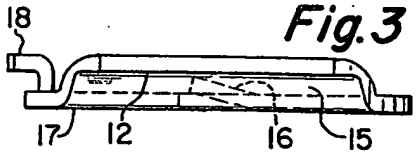


Fig.3

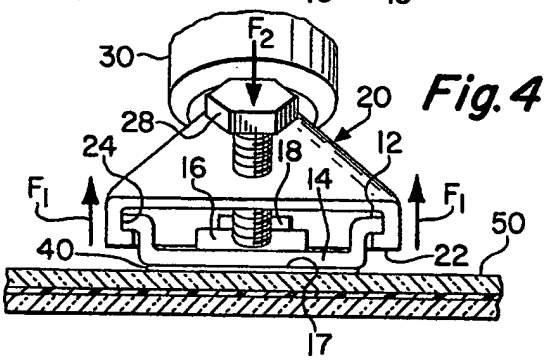


Fig.4

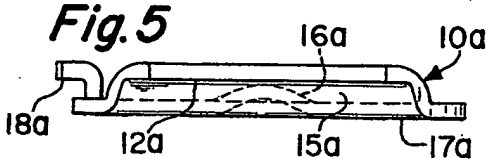


Fig.5

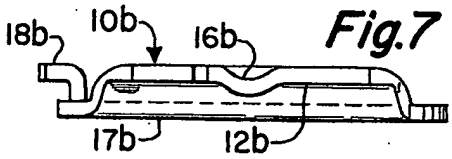


Fig.7

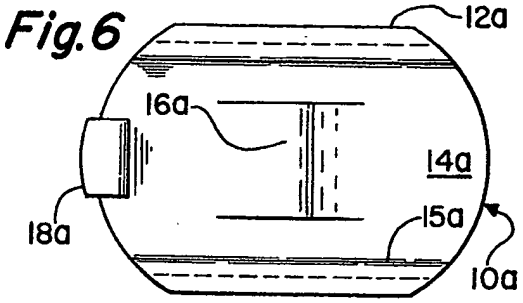


Fig.6

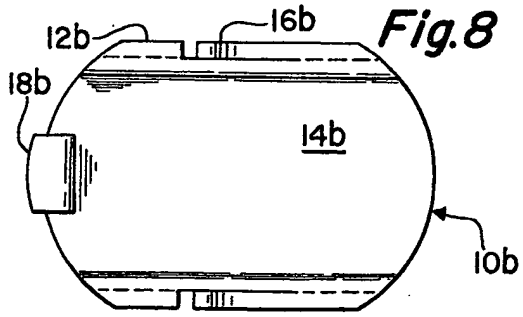


Fig.8

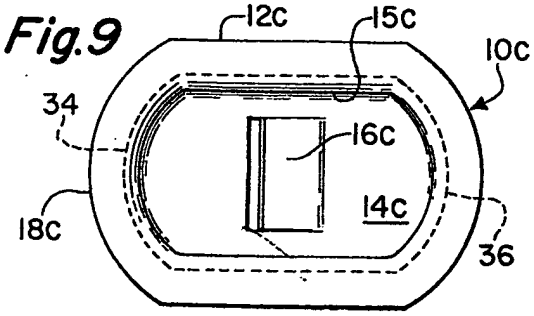


Fig.9

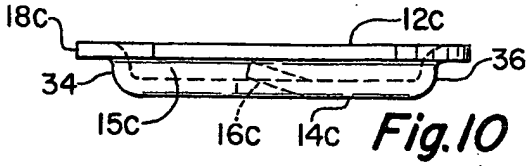


Fig.10

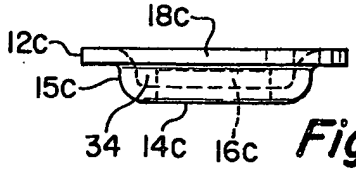


Fig.11

ADHESIVE MOUNTING DEVICE

This invention relates broadly to a system for mounting devices to a work surface by means of adhesive and is more particularly directed to an improved clip and assembly system for mounting a device, such as a rearview mirror, to the interior surface of the windshield of an automobile.

It has become desirable and popular to mount a device, such as a rearview mirror, directly to the interior surface of a windshield in an automobile. Current practices for accomplishing such direct mounting utilize an adhesive bond between a base member and the windshield followed by a mechanical connection between the base member and the device to be mounted. Since such a device is highly susceptible to vibrations, it is desirable to clamp the device to the base member in some manner.

One example of the prior art technique of fastening utilizes a base member with adhesive on one surface and having shoulders at its side edges to allow a mounting member to be slid over the base member. The mounting member usually carries the rear view mirror and the mounting member is clamped in position through the use of a set screw after the base member has been adhesively bonded to the inner surface of a windshield. To insure that the mounting member is secure in the mounted position, the screw must be tightened to such an extent that clamping loads in the system are relatively high. While the adhesive utilized is designed to generally withstand the original clamping load, it usually cannot withstand any increase in clamping loads. Consequently, if the mounting member and base member are of different materials having different coefficients of expansion, a change in temperature could possibly alter the relative dimensions of the two members to such an extent that the clamping load on the base member is appreciably increased. Such an increase in clamping load will cause an accompanying increase in the load on the adhesive bond line. This increase of load on the adhesive will commonly be in the form of peel forces which are the most difficult for an adhesive layer to resist and thus the bond line between the base and the windshield fails, causing the base member and the mirror to become disassociated from the windshield. It is also possible that the differential of coefficient of expansion will cause the clamping force between the mounting member and the base member to diminish thus permitting the assembly to rattle and perhaps become damaged during excessive vibration.

Accordingly, it is primary object of this invention to provide a mounting system which will permit variations in the clamping load within the system once the device has been clamped to the base member and the base member has been adhesively secured to a work surface.

It is another object of this invention to provide an adhesive mounting clip which is capable of absorbing increases in forces tending to peel the clip from the work surface.

A further object of the invention is to provide a mirror mounting assembly wherein a portion of the assembly is adhesively preassembled to the windshield and a second portion of the assembly is removably associated with the first member.

Accordingly, the present invention satisfies the above and other objects and advantages through the provision of a spring member integral with an attaching clip

which is adhesively secured to a windshield or the like. The clip is designed to slidably receive a mounting member carrying a device, such as a mirror. The mounting device will typically include a set screw which is tightened against the clip in order to clamp the mounting member to the clip. In the preferred embodiment of the invention, the set screw bears directly on the spring member. The system may thus be preloaded to accommodate any changes in clamping pressure which may result through the differential expansion of the mounting member and base member. In secondary embodiment, the spring portion may be provided between the associated clamping shoulders of the mounting member and clip.

Other objects and advantages will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of base and mounting member of the invention prior to assembly.

FIG. 2 is a top plan view of a preferred embodiment of the clip incorporated in this invention.

FIG. 3 is a side view of the clip shown in FIG. 2.

FIG. 4 is an end view of the mounting member and the base member after they have been assembled and clamped together.

FIG. 5 is a side view of an alternate embodiment of the clip of the present invention.

FIG. 6 is a top plan view of the embodiment shown in FIG. 5.

FIG. 7 is a side view of a further modification of a clip according to the present invention.

FIG. 8 is a top plan view of the clip modification shown in FIG. 7.

FIG. 9 is a top plan view of another embodiment of the invention.

FIG. 10 is a side view of the clip shown in FIG. 9.

FIG. 11 is a front end view of the clip shown in FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference numerals throughout the various views of the drawings are intended to designate similar elements or components.

Turning first ot FIG. 1, there is shown a mounting system comprising a base plate or clip 10 adhered to a surface, such as a portion of a windshield 50, and adapted to slidably receive a mounting member 20. The clip 10 will preferably be preassembled, by an adhesive bond, to the windshield 50 to facilitate handling. The mounting member 20 may subsequently be slid over the clip in the direction of the arrow A and clamped thereon through the use of a set screw 28. A mirror assembly 30 is typically fixed or removably attached to this mounting member 20.

From FIGS. 2 and 3 it will be shown that the clip 10 is generally configured to include a pair of side edges in the form of outwardly extending shoulders 12 which are spaced from a faying surface 17 on a central base surface 14. The clip 10 may advantageously be constructed as a stamping in the form of a channel with the base surface 14 forming the bottom wall and including side walls 15 terminating at the shoulder portions 12. Faying surface 17 of the clip will preferably be pro-

vided with a layer of heat activatable adhesive 40 so that the clip may be placed on the windshield 50 and secured thereto, allowing the windshield and the clip to be handled as a unit.

Turning to FIG. 4, there is shown the mounting member 20 associated with and clamped to the clip 10 which is adhesively secured to windshield 50. The side edges and shoulders 12 of the clip, being spaced from the surface of the windshield, are thus adapted to overlie lip portions 22 of the mounting member when the member is slidably associated with the clip. A channel shaped groove 24 above the lips 22 in the mounting member allows the shoulders of the clip to be slidably received in the mounting member. A front stop 18 on the clip and an associated front wall 26 of the mounted member limit the movement of the mounting member relative to the clip and thus serve to position the member relative to the clip. When properly located, the set screw 28 is tightened against the base 14 of the clip in order to draw up the member into clamping engagement with the clip. The direction of the clamping forces exerted on the clip in the system are illustrated in FIG. 4 by arrows F1 and F2. It should be apparent that forces F1 tend to produce a peel stress on the adhesive layer 40. It should also be apparent that if the mounting member is of a material having a different coefficient of expansion from the clip member, there will be a change in the clamping pressure as a result of a change in temperature. For example, if the temperature increases and mounting member 20 has a coefficient of expansion greater than the clip 10, then there would be a lessening of the clamping pressure between the shoulder and the lip portions of the respective members. However, if there is a decrease of temperature, the member 20 will contract relative to member 10. causing an increase in forces F1 on the shoulders 12 of the clip and, of course, an equal and opposite increase in force F2 on the base of the clip 14. Such an increase in clamping force frequently exceeds the designed peel strength of the adhesive bond and tends to cause a failure in the bond.

In actual practice, the mounting member 20 will be of a die cast material which will have a relatively high coefficient of expansion while the clip member 10 will be of a material, such as stainless steel, having a coefficient of expansion less than that of the mounting member. The clip member 10 is preferably constructed from material which has a relatively low coefficient of expansion so as to be consistent with the coefficient of expansion of the windshield glass 50.

The preferred embodiment of the clip 10 shown in FIGS. 1–4, includes a spring-like tab 16 struck up from the bottom wall 14 of the channel shaped structure. This tab 16 is positioned to accept the extremity of the set screw 28. As shown in FIG. 4, the screw 28 is tightened against this tab 16 and the system may thus be preloaded by tightening the screw so that there is a slight downward deflection of the tab. This tab thus provides a spring in the system which will absorb any variance in the clamping pressures F1 and F2. If the clamping pressure in the system decreases, the tab will exert an upward force on the screw as a result of the preloaded condition. This substantially eliminates the possibility that the mounting member 20 will vibrate or will be otherwise free to move relative to the clip after assembly. More importantly, however, the tab 16 will be capable of further downward deflection should the clamping forces increase after the system has been installed. Temperature changes causing changes in dimensions in this system will thus be absorbed by the spring 16.

While the tab is shown as a cantilever-type spring member in the preferred embodiment, it should be apparent that other configurations of springs can be incorporated in the clip. For example, FIGS. 5 and 6 describe such an alternate configuration wherein spring means 16*a* is in the form of a portion formed upwardly and sheared from the base 14*a* of the clip. This formed strip will accept an increase in clamping loads as well as provide means to preload the system similar to the spring tab described above.

The embodiment shown in FIGS. 7 and 8 indicates that the spring can be located at other portions of the system where the clamping loads exist. For example, spring 16*b*, in clip 10*b*, is formed in the shoulders 12*b*. The sheared and formed spring 16*b* may be compressed upon an increase in clamping load in the shoulder area of the clip and thus will function in a manner similar to the other embodiment of the invention. The location of the spring in the shoulders of the clip also provides an uninterrupted faying surface 17b which may enhance the esthetic value of the system in addition to increasing the surface area to be bonded.

The embodiment shown in FIGS. 9–11 includes an upstanding side wall about the entire perimeter of the base surface 14c. Front wall portion 34 and rear wall portion 36 will further strengthen and reinforce the clip 10*c* against forces such as F_1 applied beneath the shoulders 12*c* tending to peel the base from the support surface. The walls 34 and 36 extending transversely of the clip allows any change in force on the system to be absorbed entirely by the spring tab 16*c*. The front wall 34 and outwardly extending flange 18*c* will also serve as an abutment to limit the movement of the mounting member relative to the clip and to accurately position the mounting member on the clip.

The adhesive layer 40 may be of any suitable adhesive composition, however it has been found that for ease of handling and application a heat activatible adhesive, such as polyvinyl butyral resin, is desirable. It should also be understood that a variety of shapes of workpieces may exist, such as a windshield with a slight curvature. Although the preferred embodiments described above show a generally planar bottom wall 14 and faying surface 17, it should be understood that these surfaces can be modified to conform to the surface to be adhered.

Thus, it is apparent that there has been provided, in accordance with the invention, a mounting system which includes a spring that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the appended claims.

I claim:

1. A system for mounting devices to a primary workpiece including a base plate member having one surface adapted to be adhesively secured to the primary workpiece through an adhesive bonding layer, opposing side edges of the base member including shoulder surface means in spaced relationship to the said one surface, a mounting member adapted to be slidably

positioned over the base plate, the mounting member including lip portions extending inwardly from the opposite side edges thereof to underlie the shoulder surface means when associated therewith, the opposing lip portions and shoulder surface means forming a first set of opposing clamping surfaces, the means to clamp the mounting member being adapted to bear against a predetermined region of the base plate and thereby forming a second set of opposing clamping surfaces, spring means positioned between at least one set of opposing clamping surfaces and adapted to relieve the stress on the adhesive bonding layer when the system is mounted on the primary workpiece as a result of the clamping pressure between the two members as well as preloading the system.

2. The mounting system as claimed in claim 1 of the type wherein the base plate member and mounting member have different coefficients of expansion causing changes in the clamping pressure between the two elements subsequent to positionment and clamping together wherein the base plate member has a recess formed therein, and includes a bottom wall adapted to be bonded to the primary workpiece, side wall portions upstanding from the bottom wall including outwardly extending flanges forming said shoulder surface means.

3. The mounting system of claim 2 wherein the base plate member is channel shaped.

4. The mounting system in accordance with claim 2, wherein the bottom wall of the base plate member is substantially surrounded by upstanding wall portions.

5. The mounting system in accordance with claim 2, wherein the spring means includes a struck-up portion with the extremities thereof integral with the bottom wall and including an intermediate segment bulged upwardly from the bottom wall and adapted to be resiliently compressed by clamping means when a device is associated therewith.

6. The mounting system as claimed in claim 1 wherein the base plate member and mounting member include abutment means to limit the sliding movement of the mounting member in one direction.

7. The mounting system as claimed in claim 1 wherein the means to clamp the mounting member includes a set screw extending through the mounting member into engagement with the base plate serving to clamp the clip portions and the shoulder surface means together.

8. The mounting system in accordance with claim 7 wherein the set screw bears against the spring means formed in the base plate to resiliently accommodate changes in the clamping pressure between the mounting member and the base plate wherein the stress on the adhesive bond line may remain substantially uniform.

9. The mounting system in accordance with claim 7 wherein the base plate member carries adhesive means on said one surface, said one surface further including the spring means in the form of a struck-up portion positioned intermediate the shoulder surface means.

10. The mounting system in accordance with claim 7 wherein the spring means is provided between the lip portions and shoulder surface means.

11. The mounting system in accordance with claim 10 wherein the spring means is a struck-up tab formed in the shoulder surface means.

* * * * *

US006540193B1

(12) **United States Patent**
DeLine

(10) **Patent No.: US 6,540,193 B1**
(45) **Date of Patent: Apr. 1, 2003**

(54) **REARVIEW MIRROR MOUNTING ASSEMBLY**

(75) Inventor: **Jonathan E. DeLine**, Holland, MI (US)

(73) Assignee: **Donnelly Corporation**, Holland, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/470,791**

(22) Filed: **Dec. 23, 1999**

(51) **Int. Cl.**[7] **A47G 1/24**
(52) **U.S. Cl.** **248/481**; 248/483; 359/871
(58) **Field of Search** 248/481, 483, 248/484, 288.31, 288.51, 478; 359/871, 872, 873

(56) **References Cited**

U.S. PATENT DOCUMENTS

541,727	A	6/1895	Dennis	
1,521,508	A *	12/1924	Denoux	
1,800,797	A	4/1931	Hoople	
1,857,095	A	5/1932	Glowacki	
2,414,223	A	1/1947	De Virgilis	240/4.2
2,456,182	A	12/1948	Goble	285/92
2,763,188	A	9/1956	Bertell	88/98
2,856,815	A	10/1958	Ross	88/98
2,921,808	A	1/1960	David	287/12
2,973,980	A	3/1961	Vogt et al.	287/87
3,009,712	A	11/1961	Williams	280/95
3,022,096	A *	2/1962	Schwartz	
3,104,897	A	9/1963	Berger	285/166
3,177,020	A	4/1965	Dumpis	287/87
3,367,616	A	2/1968	Bausch et al.	248/483
3,374,016	A	3/1968	Melton et al.	287/87
3,448,553	A	6/1969	Herr et al.	52/400
3,498,579	A	3/1970	Vicary	248/483
3,530,495	A	9/1970	Kindel	287/87
3,601,352	A	8/1971	Jensen et al.	248/481
3,622,112	A	11/1971	Stroh	248/181
3,635,435	A	1/1972	Perison, Sr.	248/475
3,774,996	A	11/1973	Donnelly	350/302
3,841,769	A *	10/1974	Bowerman	
4,254,931	A	3/1981	Aikens et al.	248/549

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

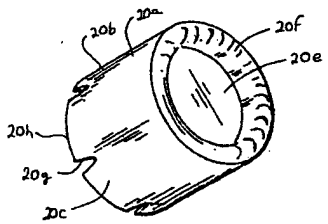
GB	1132384	10/1968	B60R/1/04

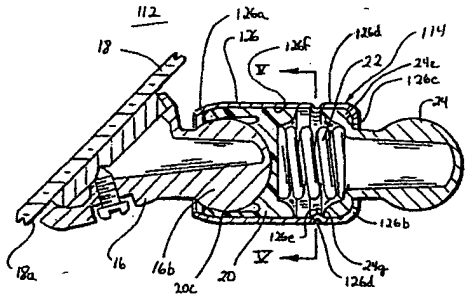
Primary Examiner—Korie Chan
(74) *Attorney, Agent, or Firm*—Van Dyke, Gardner, Linn & Burkhart, LLP

(57) **ABSTRACT**

A rearview mirror mounting assembly comprises a mounting arm which is pivotally secured to a mounting base and may be further pivotally attached to an accessory or an interior rearview mirror. The mounting arm comprises a ball receiving portion for receiving and pivotally engaging a ball member on the mounting base. The ball receiving portion tightly engages the ball member in response to a biasing force exerted on the ball receiving socket by a biasing member within the mounting arm. The biasing member is aligned and guided within the mounting arm via at least one confinement member, such as an annular guide portion, extending longitudinally within the arm and surrounding at least one substantially flat or planar surface, which the biasing member engages. Preferably, one of the surfaces is rigidly secured to the arm, thereby reducing potential vibration between the arm and the interior rearview mirror. Preferably, the arm comprises a ball-in and ball-out mounting arrangement which provides a double ball joint mount for the interior rearview mirror.

34 Claims, 5 Drawing Sheets





U.S. PATENT DOCUMENTS

4,382,572 A		5/1983	Thompson	248/484
4,492,488 A	*	1/1985	Warshawsky	
4,614,412 A		9/1986	Cohen	350/632
4,632,348 A		12/1986	Keesling et al.	248/222.1
4,646,210 A		2/1987	Skogler et al.	362/142
4,822,140 A		4/1989	Mittelhauser	350/279
4,936,533 A		6/1990	Adams et al.	248/222.1
5,100,093 A	*	3/1992	Rawlinson	
5,100,095 A		3/1992	Haan et al.	248/549
5,308,247 A		5/1994	Dyrdek	439/34
5,327,288 A		7/1994	Wellington et al.	359/606
5,521,760 A		5/1996	De Young et al.	359/601
5,572,354 A		11/1996	Desmond et al.	359/265
5,576,687 A		11/1996	Blank et al.	340/438
5,669,698 A		9/1997	Veldman et al.	362/83.1
5,671,996 A	*	9/1997	Bos et al.	
5,820,097 A		10/1998	Spooner	248/549
5,984,482 A		11/1999	Rumsey et al.	359/871

* cited by examiner

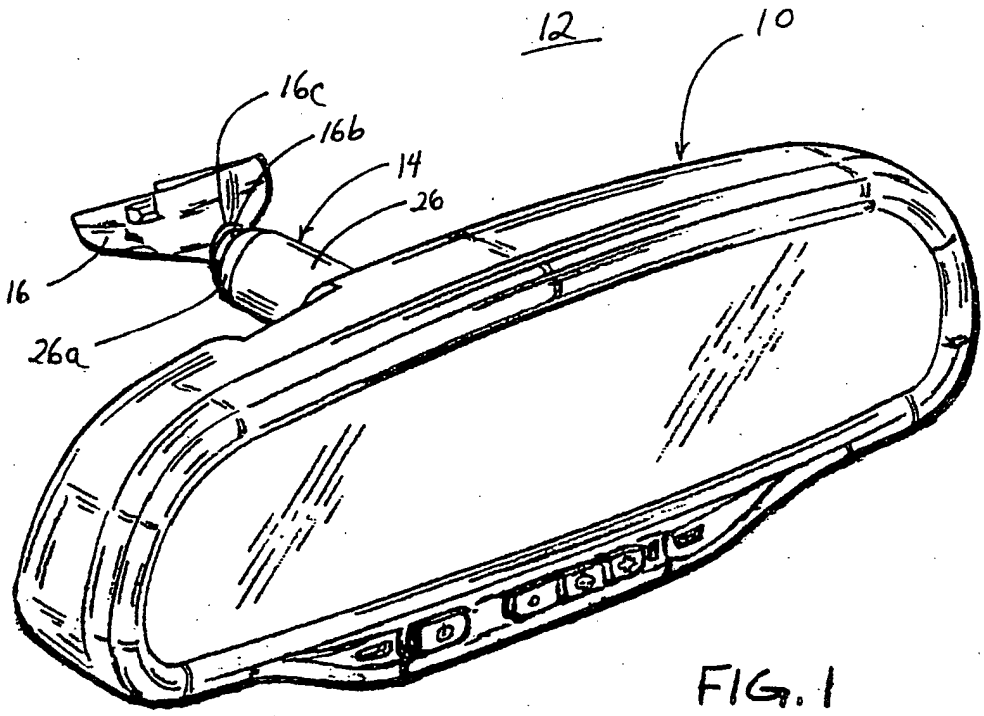


FIG. 1

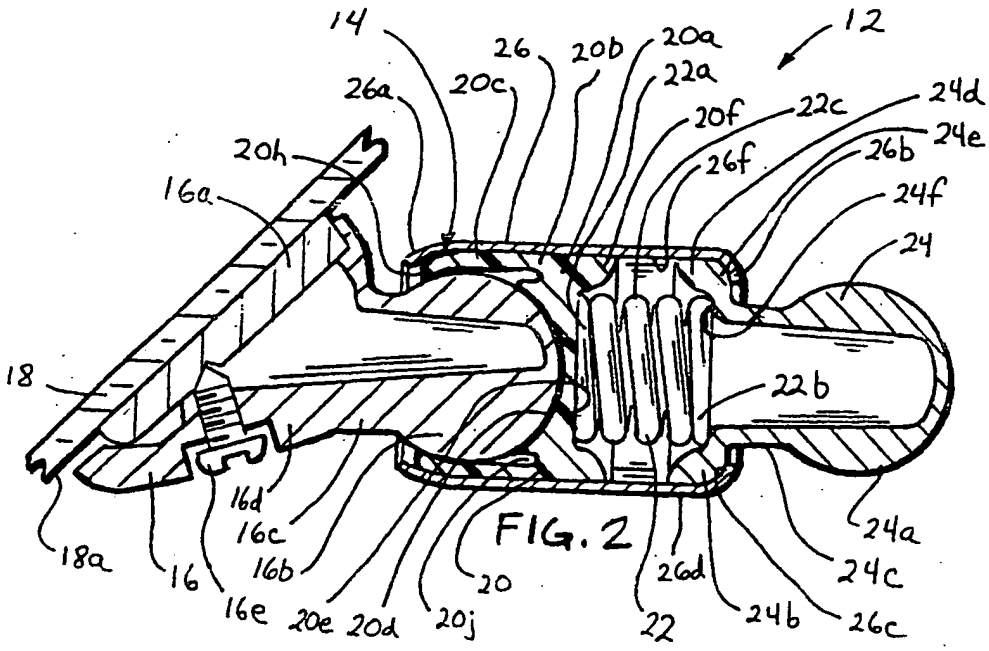


FIG. 2

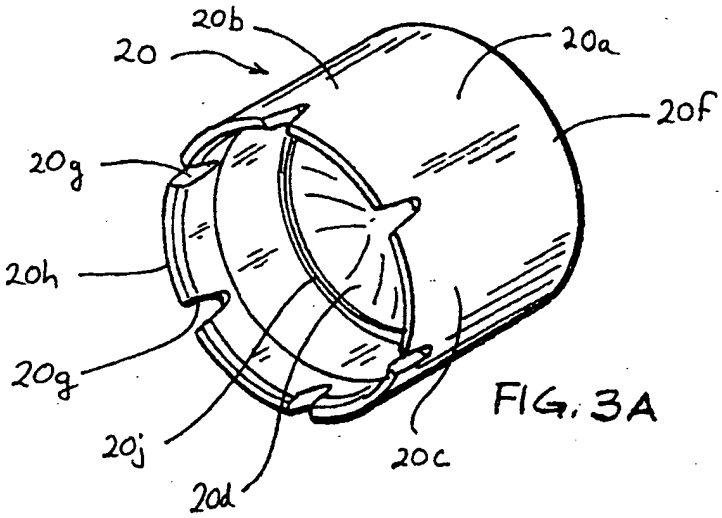


FIG. 3A

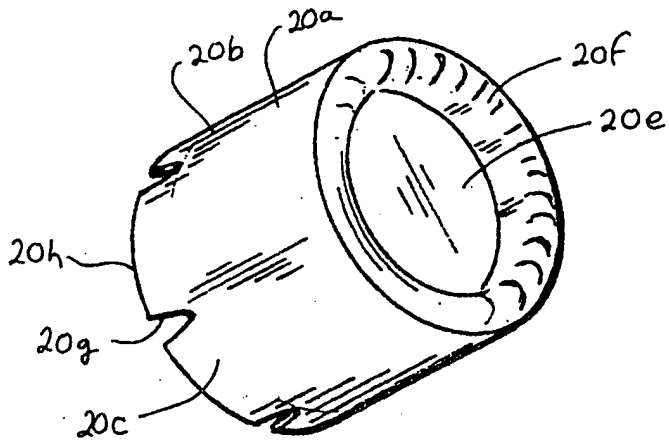


FIG. 3B

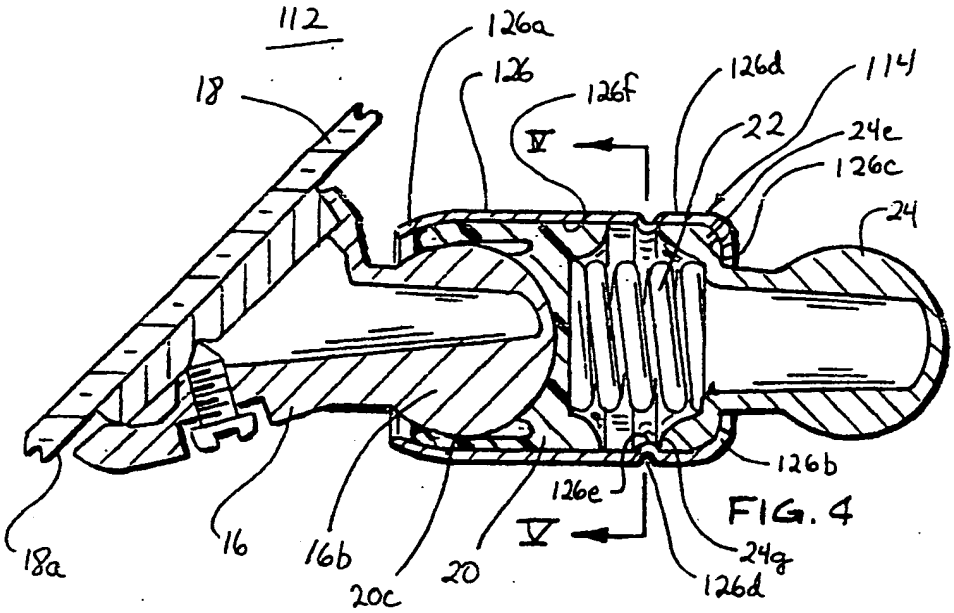


FIG. 4

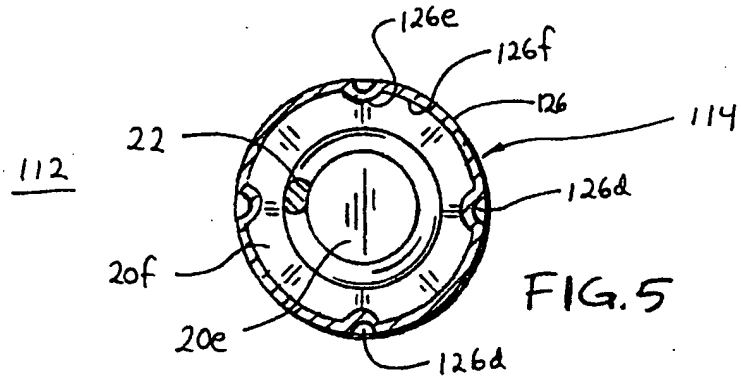


FIG. 5

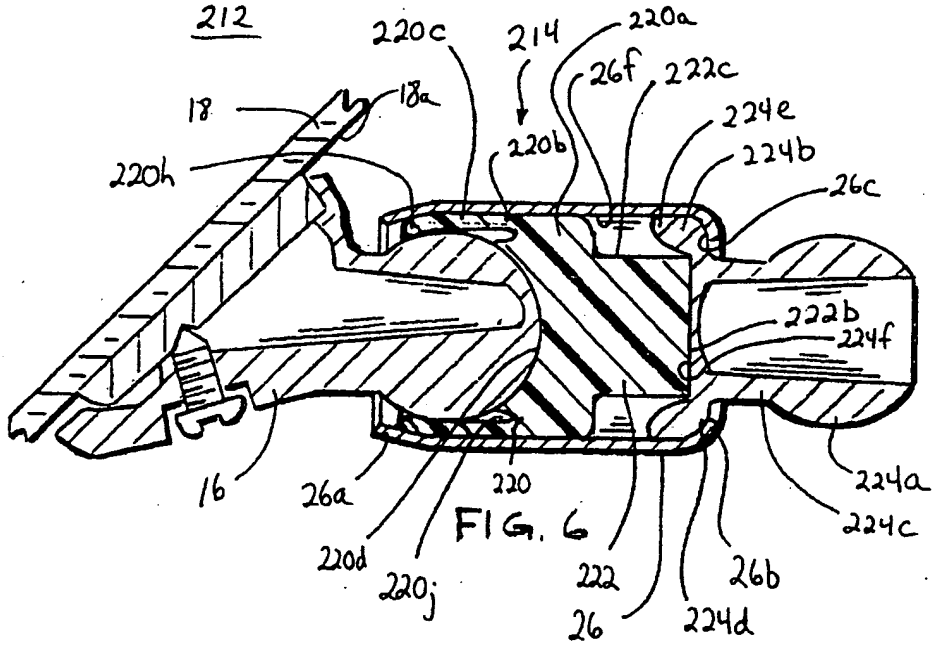
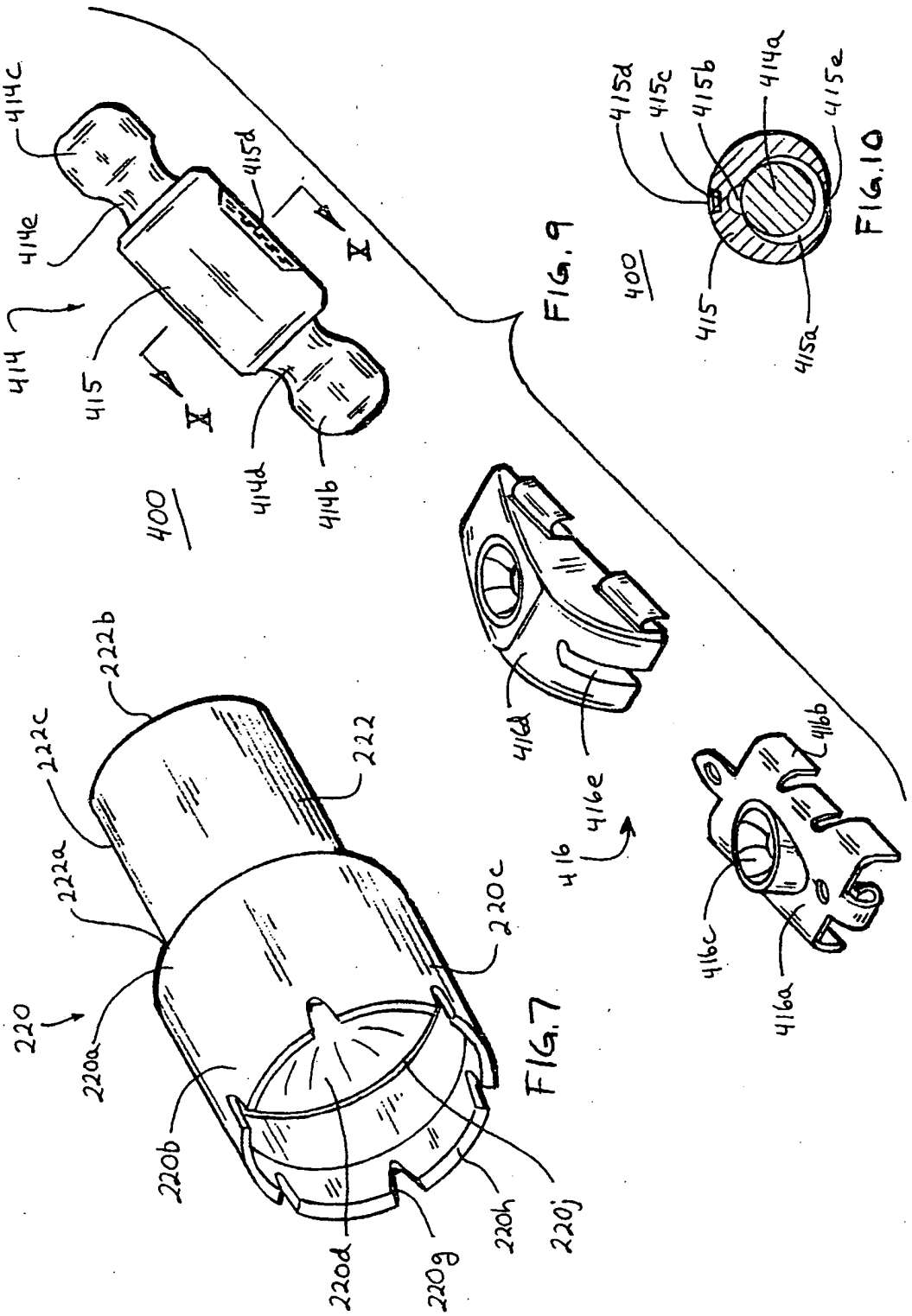


FIG. 6


414c
415d
414e
X
414
415
X
414d
414b
400
FIG. 9
415d
415c
415b
414a
415e
400
415
415a
FIG. 10
222b
222c
222
222a
220
220a
220b
220d
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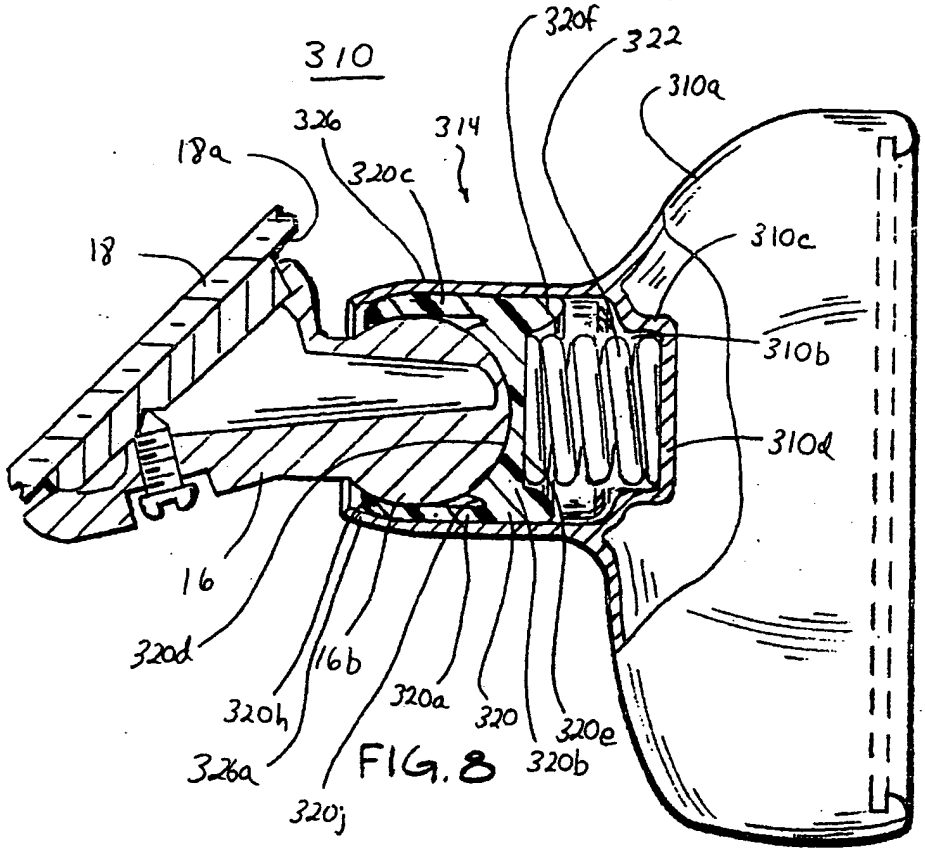
220j
220c
FIG. 7
416d
416
416e
416b
416c
416a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320f
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310a
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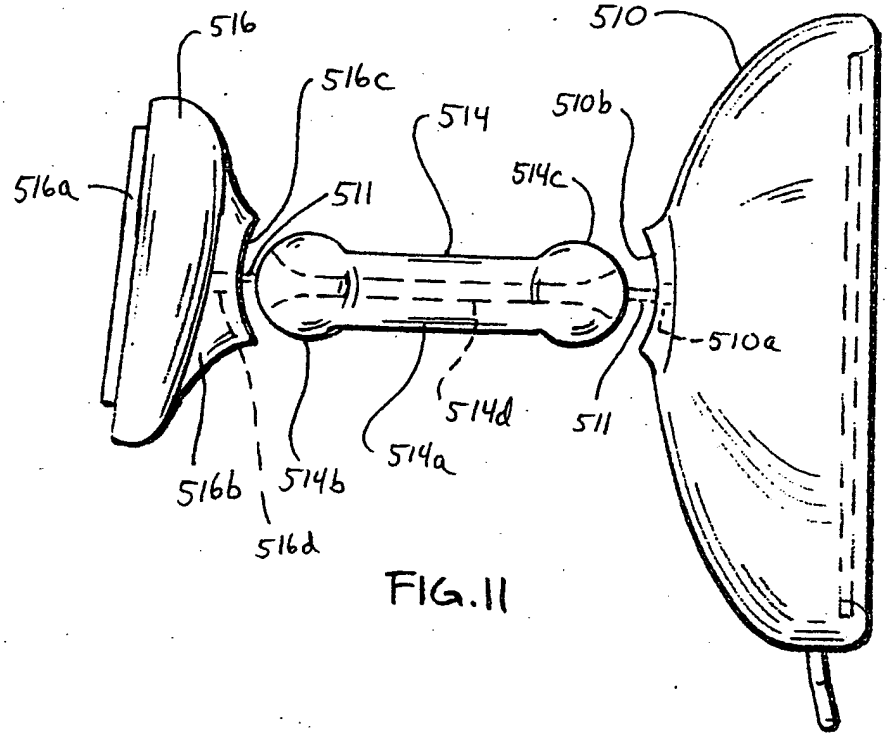
314
18a
320c
18
310c
310b
310d
16
320d
16b
320h
320a
320
320e
326a
320b
320j

FIG. 8


516
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510b
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514c
510a
514d
511
516b
514b
514a
516d

FIG. 11

REARVIEW MIRROR MOUNTING ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates generally to a rearview mirror mounting assembly and, more particularly, to a rearview mirror mounting assembly which pivotally mounts an interior rearview mirror to a mounting base attached to the vehicle.

Mounting brackets for supporting rearview mirrors are well known in the art. Typically, a rearview mirror is mounted to a mounting base via one or more ball and socket connections or joints. The double jointed mounting bracket allows for further movement of the interior rearview mirror relative to the mounting base, which is typically secured to an interior surface of the windshield of the vehicle or to a headliner or console at an upper edge of the windshield. The bracket must tightly retain a ball within the socket of the ball and socket joint, while still allowing relative rotation or pivoting therebetween. If the joints are not tightly secured, the interior rearview mirror may experience excessive vibration when the vehicle is being driven. These vibrational concerns are further enhanced when the interior rearview mirror comprises multiple components and electronic circuitry, such as electrochromic reflectors, microphones, map reading lights, and/or other accessories, which may add to the weight of the interior rearview mirror. These accessories increase the weight of the mirrors, such that the mirrors are not stable with a conventional double ball and socket-mounting bracket.

It is known to implement larger sized ball and socket joints to provide increased friction and thus greater stability between the ball and socket members of the mounting bracket. The larger ball further allows for a larger neck on the mounting bracket to increase bending inertia of the bracket. At the same time, however, it is preferred to minimize the size of the bracket components to enhance the appearance of the mirror assembly.

In order to provide a tight grip on the ball member, a spring or other biasing member may be implemented within a support arm of the mounting assembly in order to increase the gripping or clamping of the ball by the socket portion of the assembly. The spring is typically mounted and secured within the arm such that the spring exerts a force on the socket portion, which causes the socket to partially compress about the ball. A raised portion or ridge on the socket portion is provided which extends partially within the center of the spring, in order to properly align the spring within the mounting arm. The spring thus has to have a sufficient diameter to receive the raised portion within the coils of the spring.

These operational aspects of rearview mirror supports illustrated a need for supporting higher weight, added feature rearview mirrors while minimizing vibration, and for reducing functional problems in mirror supports such as misaligned springs, all while maintaining a pleasing overall appearance.

SUMMARY OF THE INVENTION

The present invention is intended to provide a mirror mounting assembly which pivotally mounts an interior rearview mirror to a mounting base positioned on the vehicle. Preferably, the mirror is mounted or connected to the mounting base via a dual ball and socket joint, at least one of which comprises a ball receiving cavity which pivotally receives a ball member therein. The ball receiving cavity maintains a secure grip on the ball member via a biasing member which is aligned and contained within a sleeve of the mounting assembly. The present invention is preferably implemented with an interior rearview mirror which comprises one or more electrical accessories and is thus of a greater weight than a standard mirror. For example, the mirror may weigh approximately 300 grams and may even weigh greater than approximately 500 grams.

According to a first aspect of the present invention, a support bracket for pivotally securing an accessory to a vehicle comprises a mounting base and a mounting arm. The mounting base is adapted for mounting to the vehicle. The mounting arm is pivotally securable to at least one of the mounting base and the accessory. The mounting arm comprises at least one ball receiving socket, a biasing member, an alignment element for aligning the biasing member. The alignment element comprises an outer confinement member which engages at least a portion of an outer surface of the biasing member. Preferably, the mounting arm further comprises a sleeve which at least partially encases the ball receiving socket and the biasing member. The ball receiving socket pivotally receives a ball member of one of the mounting base and the accessory. The confinement member extends at least partially along the biasing member to align the biasing member within the sleeve such that the biasing member biases the ball receiving socket toward the ball member, thereby pivotally securing the ball member therein.

Preferably, the confinement member comprises an annular ring. Preferably, the alignment element further comprises a substantially planar surface at a base of the confinement member, whereby an end of said biasing member engages the planar surface. Preferably, the sleeve is narrowed at an end corresponding to the ball receiving socket. The narrowed end is operable to clamp the ball receiving socket about the ball member in response to the biasing member biasing the socket toward the narrowed end of the sleeve. Preferably, a second ball member is rigidly secured at an end of the sleeve opposite the narrowed end. A base portion of the second ball member comprises the alignment element to align the biasing member between the ball receiving socket and the second ball member.

In one form, the biasing member is a coil spring which engages a planar, recessed region in the ball receiving socket. In another form, the biasing member is unitarily formed with the ball receiving socket and compressibly engages a recessed region at one of a ball receiving socket of the mounting arm, a ball member of the mounting arm, and the mirror itself.

According to another aspect of the present invention, a support bracket pivotally secures an accessory to the vehicle. The accessory has at least one electronic component which is electrically connected to a vehicle wiring via an accessory wiring. The support bracket comprises a mounting base and a mounting arm. The mounting base is adapted for mounting to the vehicle and comprises a first ball receiving socket. The mounting arm pivotally secures to the mounting base and to the accessory. The mounting arm comprises a first ball member for pivotally engaging the first ball receiving socket and a second ball member for pivotally engaging a second ball receiving socket on the accessory. The first ball member is positioned at an opposite end of the mounting arm from the second ball member. The mounting arm further comprises an outer sleeve which at least partially encases the mounting arm and the accessory wiring.

Therefore, the present invention provides a support assembly which provides pivotable mounting of an acces-

sory or mirror relative to a mounting base. The alignment of the biasing member is maintained via at least one confinement member, such as an annular guide which extends along the arm of the support assembly, which substantially precludes lateral movement of the biasing member relative to the support assembly. A second ball member of the support assembly may be rigidly secured to the sleeve to further reduce vibration of the mirror. The first and second ball members may comprise the same sized ball or may have different diameter ball members. For example, the second ball member of the support assembly may have a greater diameter than the first ball member of the mounting base.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view looking forwardly in a vehicle of a rearview mirror mounting assembly in accordance with the present invention;

FIG. **2** is sectional side view of the mounting assembly of FIG. 1;

FIG. **3A** is a perspective view of a ball receiving socket showing the ball receiving portion of the socket;

FIG. **3B** is a perspective view of the opposite end of the socket of FIG. 3A, showing the alignment ring and surface for the biasing member;

FIG. **4** is a sectional side view of an alternate embodiment of the present invention;

FIG. **5** is a sectional end view of the mounting arm, taken along the line V—V in FIG. 4;

FIG. **6** is a sectional side view of another alternate embodiment of the present invention wherein the ball receiving socket further comprises the biasing member;

FIG. **7** is a perspective view of the ball receiving socket shown in FIG. 6;

FIG. **8** is a sectional side view of another alternate embodiment of the present invention, wherein the mounting arm is fixedly secured to the interior rearview mirror;

FIG. **9** is a perspective exploded view of another alternate embodiment of the present invention;

FIG. **10** is a sectional end view of a mounting arm and plastic cover, taken along the line X—X in FIG. 9

FIG. **11** is a side elevation of another embodiment of the bracket assembly of FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now specifically to the drawings, and the illustrative embodiments depicted therein, an accessory or interior rearview mirror **10** is pivotally mounted to a mounting assembly **12**, which comprises a mounting arm **14**, which is pivotally mounted to a mirror mount or mounting base **16** (FIG. 1). Mounting arm **14** of mounting assembly **12** preferably comprises a ball receiving member **20**, a biasing member **22**, a second ball member **24** and a sleeve member **26** which at least partially encases ball receiver **20**, biasing member **22**, and second ball member **24** (FIG. 2). Preferably, biasing member **22** is positioned and aligned between ball receiver **20** and second ball member **24** and functions to bias ball receiver **20** outwardly from second ball member **24** and biasing member **22**, such that ball receiver **20** grips ball member **16***b*, as discussed in detail below. Biasing member **22** is aligned longitudinally along sleeve **26** between ball member **24** and ball receiver **20** via a confining member, such as a raised annular ring **20***f*, which is preferably at least partially cylindrical in section, and/or a corresponding confining member or annular ring **24***d*, which extend longitudinally from a respective base or generally planar surface **20***e* and/or **24***f* at either or both of ball receiver **20** and/or ball member **24**, respectively, as discussed below.

The interior rearview mirror **10** may be a conventional electrochromic or prismatic day/night interior mirror and may comprise additional electronic components, such as map reading lights, a speaker and/or microphone, which may be in the mirror or within a module attached to the mirror or mounting arm as disclosed in commonly assigned co-pending U.S. patent application, Ser. No. 09/382,720, filed Aug. 25, 1999, now U.S. Pat. No. 6,243,003, an indicator for the microphone of the type disclosed in commonly assigned U.S. patent application, Ser. No. 09/396,179, filed Sep. 14, 1999, now U.S. Pat. No. 6,278,377, displays, such as of the type disclosed in commonly assigned co-pending U.S. patent application, Ser. No. 09/448,700, filed Nov. 24, 1999 by Timothy G. Skiver, Joseph P. McCaw, John T. Uken, and Jonathan E. DeLine for REARVIEW MIRROR ASSEMBLY WITH ADDED FEATURE MODULAR DISPLAY, now U.S. Pat. No. 6,329,925, communication systems, which may comprise a processing system of the type disclosed in commonly assigned U.S. patent application, Ser. No. 09/466,010, filed Dec. 17, 1999 by Jonathan E. DeLine, Niall R. Lynam, Ralph A. Spooner and Philip A. March for INTERIOR REARVIEW MIRROR SOUND PROCESSING SYSTEM, now U.S. Pat. No. 6,420,975, Attorney Docket Number DON01-787, and/or the like, all of the disclosures of which are hereby incorporated herein by reference. Additionally, the interior rearview mirror may comprise storage capabilities, such as disclosed in commonly assigned U.S. patent application, Ser. No. 09/449,121, filed Nov. 24, 1999, now U.S. Pat. No. 6,428,172, and/or a compartment for electrical accessories, such as disclosed in commonly assigned co-pending U.S. patent application, Ser. No. 09/433,467, filed Nov. 4, 1999, now U.S. Pat. No. 6,326,613, and/or the like; the disclosures of which are hereby incorporated herein by reference. Because the rearview mirror may comprise one or more electrical accessories and may function to store other items, the mirror may have a greater weight than a standard prismatic mirror. Preferably, support assembly **12** supports an interior rearview mirror **10** weighing at least approximately 300 grams. More preferably, support assembly **12** supports an interior rearview mirror **10** which weighs at least approximately 400 grams and most preferably, at least approximately 500 grams.

The mount **16** may be secured, such as by an adhesive, to an interior surface **18***a* of a vehicle windshield **18** (FIG. 2) and may be a conventional mounting button, channel mount, a base member of the type disclosed in commonly assigned U.S. Pat. No. 4,936,533, issued to Adams et al., the disclosure of which is hereby incorporated herein by reference, or a breakaway mount of the type disclosed in commonly assigned U.S. Pat. No. 5,820,097, issued to Spooner, or U.S. Pat. No. 5,100,095, issued to Haan, et al., the disclosures of which are hereby incorporated herein by reference.

Preferably, as shown in FIG. 2, mounting base **16** of mounting assembly **12** is secured to a mounting plate **16***a* (commonly referred to in the art as a mirror mounting button), which is secured to interior surface **18***a* of the windshield **18**. Mounting plate **16***a* may be secured to the interior surface of the windshield, such as by an adhesive, or may be secured to a headliner or console (not shown) at or adjacent to an upper edge of the windshield, without affecting the scope of the present invention. Mounting base **16** preferably comprises a ball member **16***b* formed at an end of

a neck portion **16***c* extending outwardly and rearwardly from a base portion **16***d* of the mount **16**. Ball member **16***b* and neck **16***c* are preferably integrally formed with base **16***d* and may comprise a metal, such as aluminum, such as A-380 aluminum, which may be powder painted to color match mount **16** with the trim and/or mirror housing of the vehicle. However, it is further envisioned that ball member **16***b* may comprise an engineering polymer, such as a filled polymer, such as glass or mineral filled Nylon or the like, without affecting the scope of the present invention. Ball member **16***b* is a generally spherical shaped ball for pivotal engagement with a correspondingly formed receiving socket on mounting arm **14**, as discussed below. Preferably, the ball **16***b* and neck portion **16***c* are partially hollowed or cored to reduce the mass of the mounting assembly **12**. Although not critical to the present invention, the mount **16** may be secured to the base portion **16***a* via a set screw **16***e*, as shown in FIG. **2**, or via any other known mounting means, and may be a breakaway mount or any other mount secured to a headliner or console of the vehicle, without affecting the scope of the present invention.

As shown in FIGS. **1** and **2**, sleeve **26** is a generally cylindrical member which extends between mount **16** and interior rearview mirror **10**. Preferably, sleeve **26** comprises a metal tubing, such as an aluminum tubing, such as aluminum 6061T9, which may be powder coated to match the color of the mount **16** and/or interior rearview mirror **10** and/or a desired vehicle interior or trim. However, other materials, such as an engineering polymer, such as a filled polymer, such as glass or mineral filled Nylon or the like, may be implemented without affecting the scope of the present invention. Sleeve **26** is generally hollow and comprises a cylindrical side wall **26***d* which defines an inner surface **26***f* and encases ball receiver **20**, biasing member **22**, and a portion of second ball member **24**, as discussed below. Sleeve **26** is preferably tapered or narrowed toward a forward end **26***a* and further comprises an inwardly curved end **26***b*, which is generally longitudinally opposite from tapered end **26***a*. Inwardly turned end **26***b* is sharply curved radially inwardly to form a generally annular ridge or ring **26***c*, which closes a portion of the rearward end **26***b*, such that the end **26***b* has a smaller diameter opening than the cylindrical side walls **26***d* of sleeve **26**.

As shown in FIGS. **2**, **3A**, and **3B**, ball receiver **20** preferably comprises a base portion **20***a* and a ball receiving portion **20***b*. Ball receiving portion **20***b* comprises a cylindrical side wall **20***c* and a partially spherical inner surface **20***d*. Cylindrical side wall **20***c* extends longitudinally outwardly from spherical surface **20***d* of base portion **20***a*, and defines a ball receiving cavity or socket for pivotally receiving ball member **16***b* of mount **16**. Cylindrical side wall **20***c* and base portion **20***a* slidably engage inner surface **26***f* of sleeve **26** as ball receiver **20** is moved by biasing member **22**. Preferably, ball receiving socket **20** comprises an elastomeric material, such as polypropylene or the like, such that cylindrical wall **20***c* may flex radially inwardly as ball receiver **20** is moved longitudinally toward tapered end **26***a* of sleeve **26**. Preferably, as best shown in FIG. **3A**, cylindrical side wall **20***c* further comprises a plurality of notches **20***g* which extend longitudinally from a forward end **20***h* of ball receiver **20**. Notches **20***g* facilitate substantially uniform compression of forward end **20***h* of ball receiver **20** as forward end **20***h* is compressed radially inwardly by tapered end **26***a* of sleeve **26**, in response to a biasing force exerted on ball receiver **20** toward tapered end **26***a* by biasing member **22**. A circumferential groove or channel **20***j* may be formed around an outer circumferential edge of partially spherical surface **20***d* and radially inwardly of cylindrical side walls **20***c*, to further facilitate inward bending of cylindrical walls **20***c* as the walls **20***c* engage tapered end **26***a* of sleeve **26**.

Base portion **20***a* of ball receiver **20** defines partial spherical surface **20***d* at one end and further defines the means or element for aligning and guiding biasing member **22** at an end opposite the partial spherical surface **20***d*. Base portion **20***a* of ball receiver **20** comprises a substantially planar center region **20***e* and a raised or longitudinally extending annular, cylindrical outer region **20***f*. Raised annular outer portions **20***f* form a cylindrical side wall or guide around an outer circumferential edge of planar surface **20***e*, thereby defining a recessed, biasing member receiving portion of receiver **20**. A forward end **22***a* of biasing member **22** is then received by the recessed portion and thereby aligned and secured within sleeve **26** by guide walls **20***f*.

Second ball member **24** comprises a spherical shaped ball portion **24***a*, a base portion **24***b*, and a neck region **24***c* extending between base portion **24***b* and ball **24***a*. Ball portion **24***a* is positioned at an outer or rearward end of neck **24***c*, which extends from base portion **24***b*, such that ball **24***a* and neck **24***c* extend outwardly from end **26***b* of sleeve **26** in a direction generally rearwardly with respect to the vehicle. Preferably, ball **24***a*, neck **24***c* and base **24***b* are unitarily constructed and may be hollowed or cored in either direction to hollow out ball **24***a* and neck **24***c* to reduce the weight of the assembly. Ball member **24** may be substantially hollowed or cored from the forward end, as shown in FIG. **2**, or may be cored from the rearward end of ball **24***a*, as shown in FIG. **6**. Preferably, ball member **24** comprises a metal, such as aluminum, such as a die cast aluminum, which may be powder painted to match the color with sleeve **26** and/or mount **16** and/or the vehicle interior. However, it is further envisioned that other materials, such as an engineering polymer, such as a filled polymer, such as glass or mineral filled Nylon or the like, may be implemented without affecting the scope of the present in invention.

Base portion **24***b* is preferably correspondingly formed with inwardly curved end **26***b* of sleeve **26** and is positioned within sleeve **26** such that an outer shoulder **24***e* of base portion **24***b* engages annular ring **26***c* of sleeve **26**, thereby substantially precluding second ball member **24** from moving longitudinally outwardly from sleeve **26**. Preferably, ball member **24** is rigidly secured within sleeve **26**, such as by welding the shoulder portion **24***e* to curved end **26***b* of sleeve **26**, or by any other known means for securing the two components together. Alternately, the second ball member **24** may be unitarily formed with sleeve **26**, without affecting the scope of the present invention. Base portion **24***b* of ball member **24** further comprises an outer confining member or annular ring **24***d* which extends longitudinally within sleeve **26** along the cylindrical side walls **26***d*, in a direction generally opposite from neck **24***c*. Annular ring or wall **24***d* defines and encircles a generally planar, annular ring or surface **24***f* formed at base portion **24***b*, such that a rearward end **22***b* of biasing member **22** engages surface **24***f* and is received within the recess formed by ring **24***d* and planar surface **24***f*. Although shown as an annular, ring shaped surface, planar surface **24***f* may otherwise be a substantially continuous surface if ball member **24** is not cored or hollowed, or if ball member **24** is cored from the opposite end, such as is shown in FIG. **6**.

Biasing member **22** is preferably a coil spring, such as a steel spring having a spring rate of approximately 650 N/mm, although other materials and/or spring rates may be implemented without affecting the scope of the present

invention. Biasing member **22** extends longitudinally within sleeve **26** and between the planar surfaces **20***e* and **24***f* of ball receiver **20** and ball member **24**, respectively. Biasing member **22** is secured and aligned between the two components by the annular rings **20***f* and **24***d*, which extend longitudinally toward one another from the respective components **20** and **24**. The annular flanges or walls **20***f* and **24***d* function to align and laterally confine biasing member **22**, such that opposite ends **22***a* and **22***b* of biasing member **22** engage the substantially planar surfaces **20***e* and **24***f* of ball receiver **20** and ball member **24**, respectively. Lateral or radial movement of biasing member **22** is thus substantially precluded by rings or walls **20***f* and **24***d* engaging an outer surface **22***c* of biasing member **22**.

Accordingly, ball receiver **20** receives ball member **16***b* of mount **16**, such that arm **14** is pivotally secured to mount **16**. Second ball member **24** likewise engages a correspondingly formed ball receiver or socket (not shown) of interior rearview mirror **10**, such that interior rearview mirror **10** is also pivotally mounted to mounting arm **14** of mounting assembly **12**. Biasing member **22** is partially compressed when mounting arm **12** is assembled and engaged with ball member **16***b* of mount **16**, such that biasing member **22** exerts a force longitudinally along sleeve **26** toward ball receiver **20**. Because second ball member **24** is substantially fixed relative to sleeve **26**, rearward end **22***b* of biasing member **22** is also substantially fixed relative to sleeve **26**. Cylindrical side walls **20***c* of ball receiving portion **20***b* are then forced inwardly at tapered end **26***a* of sleeve **26**, such that ball receiver **20** grips ball member **16***b* on mount **16** in response to the biasing force exerted by biasing member **22**. Further longitudinal movement of ball receiver **20** is limited as outer end **20***h* of cylindrical wall **20***c* becomes wedged between sleeve **26** and ball **16***b*, since the diameter of ball **16***b* and cylindrical wall **20***c* is greater than the narrowed opening of narrowed end **26***a* of sleeve **26**. The desired level of gripping of ball **16***b* by socket **20***b* may be attained by selecting an appropriate spring rate for biasing member **22** or by altering the coefficient of friction of ball receiver **20**.

Because arm **14** comprises a ball-in (ball receiver **20** of arm **14** receives ball member **16***b*) and a ball-out (ball member **24** extends outwardly from arm **14**) mounting arrangement, mounting arm **14** provides a shorter overall length, such that the pivot joints of the mounting assembly **12** are closer to the main support or mount **16**, thereby reducing vibration of the mirror mount assembly. Furthermore, because ball member **24** is rigidly secured to or formed with the sleeve **26** of arm **14**, there is less vibration in the mounting arm assembly. Ball **24***a* of ball member **24** may be the same size as ball **16***b* of mount **16**, or may be of a greater diameter to enhance gripping within the corresponding receiving socket of the mirror, which further reduces vibration of the rearview mirror. Preferably, ball **24***a* has a greater diameter than ball **16***b*. More preferably, ball **24***a* has a diameter which is greater than approximately 20 mm, such as approximately 22.4 mm, while ball **16***b* has a diameter which is less than approximately 20 mm, such as approximately 15 mm. Alternatively, however, the ball **24***a* of ball member **24** may have a smaller diameter than the ball **16***b* of mount **16**, without affecting the scope of the present invention.

Additionally, the present invention allows a smaller diameter spring to be implemented between the ball member **24** and ball receiver **20**, while still maintaining proper alignment therebetween, since the longitudinally extending cylindrical side walls of ball receiver **20** and ball member **24** substantially preclude radial or lateral movement of biasing member **22** with respect to sleeve **26**. A center ridge or bump on the ball receiver and/or the ball member to insert within the spring is not necessary to align the spring within the mounting arm. This approach further allows for ball member **24** to be cored out from its rearward end, as shown in FIG. **6**, or its forward end, as shown in FIGS. **2** and **4**, while still providing proper alignment of biasing member **22**, all of which reduces weight and vibration in the assembly.

Referring now to FIGS. **4** and **5**, an alternate support bracket assembly **112** is shown, which comprises a mount **16** and an arm **114**. Mount **16** is substantially identical to mount **16** discussed above with respect to support assembly **12**, such that a detailed discussion of mount **16** will not be repeated herein. Arm **114** is likewise substantially similar to arm **14**, discussed above, in that it comprises a sleeve **126**, which substantially encases a ball receiving portion **20**, a biasing member **22**, and a second ball member **24**. Ball receiving portion **20**, biasing member **22**, and second ball member **24** are also substantially similar to the components discussed above with respect to support assembly **12**. Sleeve **126** is a generally cylindrical and hollow sleeve, which comprises a tapered or narrowed end **126***a* and an inwardly curved end **126***b*, similar to sleeve **26** discussed above. Likewise, tapered end **126***a* functions to force the cylindrical wall portions **20***a* of ball receiver **20** inwardly around ball member **16***b* of mount **16** in order to enhance gripping of ball **16***b* by receiver **20** and arm **14**, such that arm **114** may pivot relative to ball member **16***b*, while ball member **16***b* is substantially precluded from being removed from socket **20** and sleeve **126**. Inwardly curved end **126***b* comprises an annular ridge or lip **126***c* which engages an outer shoulder **24***e* of second ball member **24** to substantially preclude longitudinally outward movement of second ball member **24** relative to sleeve **126**, similar to sleeve **26** and second ball member **24**, discussed above.

Sleeve **126** preferably includes one or more dimples or indentations **126***d*, which are crimped inwardly to form bumps or ridges **126***e* along an inward surface **126***f* of sleeve **126**. Ridges **126***e* are positioned immediately longitudinally inwardly from an innermost portion **24***g* of cylindrical guide walls **24***e* of ball member **24**. As shown in FIG. **5**, sleeve **126** may comprise multiple dimples **126***d* which are spaced circumferentially around sleeve **126**. However, a single circumferential groove or indentation may extend around sleeve **126** and engage innermost surface **24***g* of ball member **24** along its entire circumference, without affecting the scope of the present invention. As discussed above with respect to sleeve **26**, sleeve **126** preferably comprises a metal tubing, such as aluminum tubing, and may be powder coated to color match sleeve **126** with mount **16** and ball member **24** and/or the interior rearview mirror and/or the vehicle interior. However, other materials may be implemented, similar to sleeve **26**. The dimples may be die cast in sleeve **126** or may be crimped or otherwise formed therein. The lip **126***c* and ridges **126***e* function to rigidly secure or retain ball member **24** within sleeve **26**, thereby substantially precluding movement or vibration of ball **24** relative to sleeve **126** in either longitudinal direction. By reducing the possibility of relative movement between ball **24** and sleeve **126**, overall vibration of arm **114** and support assembly **112** is reduced.

Referring now to FIGS. **6** and **7**, an alternate embodiment **212** of the mirror support assembly of the present invention is shown which comprises a mounting member **16** and an arm **214**. Mounting member **16** is substantially identical to the mount **16** discussed above with respect to support assembly **12** such that a detailed description will not be

repeated herein. Arm 214 comprises an outer sleeve 26 which at least partially encases a ball receiving socket 220 and a base portion 224*b* of a second ball member 224. Sleeve 26 is also substantially similar to sleeve 26 discussed above with respect to support assembly 12. Second ball member 224 is likewise similar to ball member 24 and comprises a partial spherical member 224*a*, a base region 224*b* and a neck region 224*c* extending between base region 224*b* and spherical portion 224*a*. Spherical portion 224*a* may be approximately the same size as ball 16*b* on mount 16 or may have a greater diameter than ball 16*b*, as discussed above with respect to ball 24*b* and ball 16*b* of support assembly 12.

Ball member 224 may be cored or hollowed from either end to reduce the weight of the assembly, similar to ball 24 discussed above. Preferably, ball member 224 is cored from an outer or rearward end, as shown in FIG. 6, such that base portion 224*b* defines a continuous, substantially planar surface 224*f* at its forward end. Base portion 224*b* comprises a cylindrical side wall or annular guide 224*e* which extends longitudinally inwardly along an inner surface 26*f* of sleeve 26. A substantially flat base surface 224*f* is formed along an inner surface of base portion 224*b* and is substantially encircled by cylindrical side walls 224*e*. As discussed above with respect to ball member 24 and sleeve 26 of support assembly 12, base portion 224*b* is formed to engage an annular ring 26*c* formed by inwardly curved portions 26*b* of sleeve 26, thereby substantially precluding longitudinal movement of ball 224 outwardly with respect to sleeve 26. Outer shoulders 224*d* of base portion 224*b* may be welded to sleeve 26, such as by a rough texture in die cast using a spin weld or lathe type process, or may be otherwise secured to inwardly turned portions 26*b* of sleeve 26.

Ball receiving member 220 comprises a ball receiving portion 220*b* and a biasing member portion 222. Ball receiving portion 220*b* comprises cylindrical side walls 220c, which may further comprise notches 220*g* at an outer end 220*h* thereof, and a base portion 220*a*, which further defines a partially spherical surface 220*d* within cylindrical walls 220*c*. An annular groove or channel 220*j* is formed around an outer edge of partially spherical surface 220*d* and immediately radially inwardly of cylindrical side walls 220*c*, to facilitate inwardly bending of cylindrical walls 220*c* as the walls 220*c* engage tapered end 26*a* of sleeve 26, similar to that discussed above with respect to support assembly 12.

Biasing member 222 is preferably unitarily formed with ball receiving portion 220*b* of ball receiver 220 and extends longitudinally from base portion 220*a* such that a forward end 222*a* of biasing member 222 is integrally formed with base portion 220*a* of ball receiver 220. Preferably, biasing member 222 is generally cylindrical and comprises an outer cylindrical wall 222*c* and a substantially flat or planar end surface 222*b* at an end of biasing member 222 opposite or rearwardly from base end 222*a*. Preferably, ball receiver 220, and thus biasing member 222 comprise an elastomer material which preferably has a spring rate of approximately 50 N/mm to 120 N/mm.

As assembled, ball receiver 220 is substantially encased by sleeve 26, as shown in FIG. 6. Biasing member 222 has a longitudinal length such that planar surface 222*b* engages flat planar surface 224*f* of ball member 224 within guide walls 224*e*. As assembled, biasing member 222 of ball receiver 220 is compressed such that biasing member 222 exerts a longitudinal force against base portion 220*a*. Tapered ends 26*a* of sleeve 26 prevent further longitudinally outward movement of ball receiver 220, since outer ends 220*h* of cylindrical side walls 220*c* become wedged between spherical ball member 16*b* and tapered end 26*a* of sleeve 26. Annular guide 224*e* engages outer cylindrical surface 222*c* of biasing member 222 and functions to properly align and retain biasing member 222, such that planar surface 222*b* of biasing member 222 remains substantially centered on base surface 224*f* of ball member 224.

Referring now to FIG. 8, an interior rearview mirror 310 comprises a mounting arm 314 which extends from a back surface 310*a* of interior rearview mirror 310 in a direction generally forwardly with respect to the vehicle. Mounting arm 314 comprises a substantially cylindrical sleeve portion 326 extending from back surface 310*a* of interior rearview mirror 310. Sleeve portion 326 is preferably fixedly secured to back 310*a* of interior rearview mirror 310 and may be unitarily formed with the mirror housing or casing. Sleeve portion 326 comprises an inwardly tapered or narrowed end 326*a* at an outer end opposite interior rearview mirror 310. A ball receiving socket 320 is positioned within sleeve 326 and is substantially similar to ball receiver 20, discussed above with respect to support assembly 12. A partial spherical surface 320*b* and a cylindrical side wall 320*c* receive a ball member 16*b* of a mount 16, which is substantially similar to mount 16 discussed above and is mounted to an interior surface 18*a* of windshield 18 in a known manner. A circumferential notch or channel 320*j* is formed between spherical surface 320*d* and walls 320*c* to facilitate radially inward flexing of walls 320*c* relative to partial spherical surface 320*d*. Tapered end 326*a* of sleeve 326 functions to force an outer end 320*h* of cylindrical wall 320*c* inward around ball member 16*b*, such that ball member 16*b* is pivotally secured within ball receiver 320 and sleeve 326. Mirror assembly 310 is thus pivotally mounted to mount 16 via a single pivot joint.

Ball receiver 320 further comprises a flat or planar surface 320*e* on a base portion 320*a* and generally opposite partial spherical surface 320*d*. A cylindrical, annular wall or guide portion 320*f* extends longitudinally inwardly toward interior rearview mirror 310 around a circumferential outer edge of planar surface 320*e*. Mirror assembly 310 further comprises a cylindrical cavity or recess 310*b* which extends inwardly into interior rearview mirror 310 or generally rearwardly with respect to the vehicle. Cylindrical cavity 310*b* is defined by a cylindrical side wall 310*c* and an inner, substantially flat or planar end surface 310*d* within interior rearview mirror 310. Cylindrical cavity 310*b* is generally centered with respect to sleeve 326, such that cylindrical cavity 310*b* is generally aligned with annular guide portions 320*f* of ball receiver 320.

A biasing member 322, such as a coiled spring or the like, is positionable between planar surface 320*e* of ball receiver 320 and planar surface 310*d* of interior rearview mirror 310. Biasing member 322 is guided and aligned between ball receiver 320 and interior rearview mirror 310 via the cylindrical side walls 310*c* of cavity 310*b* and guide walls 320f of ball receiver 320. As discussed above with respect to biasing member 22, biasing member 322 exerts a force on ball receiver 320 to press ball receiver 320 longitudinally along sleeve 326 such that cylindrical walls 320*c* of ball receiver 320 are pressed radially inwardly around spherical member 16*b* of mount 16, as ball receiver 320 is moved toward and engages tapered end 326*a* of sleeve 326, thereby facilitating pivotal engagement of connecting arm 314 on mount 16, while substantially precluding removal of ball 16*b* from sleeve 326. Although shown as a coil spring, biasing member may be any other known means for exerting a biasing force on socket 320, and may be integrally formed therewith, similar to biasing member 222 and socket 220,

discussed above, without affecting the scope of the present invention. End **326***a* may be formed into the tapered or narrowed end after insertion of biasing member **322**, ball receiving socket **320**, and ball member **16***b* into cavity or recess **310***b*.

Therefore, the present invention provides an interior rearview mirror support assembly which may be pivotally attached to a ball mount at a windshield or headliner or console of the vehicle. The support assembly may provide one or more pivotable ball and socket joints which facilitate pivotal movement of an accessory, such as an interior rearview mirror, relative to the substantially fixed ball mount on the window or headliner of the vehicle. A biasing member is positioned within a portion of the mounting assembly to maintain a tight grip on the ball member of the mount, while allowing rotational movement between the ball mount and a ball receiver within the support assembly. The biasing member is maintained in alignment with the ball receiver via at least one annular, cylindrical guide wall extending longitudinally along a portion of the support assembly. The guide wall substantially precludes lateral movement of the biasing member to maintain the biasing member in a proper orientation with respect to the ball receiver and support assembly, such that the force exerted by the biasing member on the ball receiver remains in substantially the same direction and is substantially constant to provide a substantially constant gripping force of the ball mount by the ball receiver. The present invention further provides reduced vibration in the interior rearview mirror due to the rigid connection of the mirror ball member with the arm or sleeve and the substantially uniform engagement of the ball mount via the aligned biasing member and the cylindrical walls of the ball receiver.

Referring now to FIGS. **9–11**, an alternate embodiment **400** is disclosed which comprises a mount **416** and a mounting arm **414**, which pivotally connects to the mount **416** at one end and to an interior rearview mirror at an opposite end. The interior rearview mirror may comprise one or more electronic components, such that a mirror wiring harness or the like (not shown) may be routed to the mirror to provide power and/or control of the electronic accessories via a vehicle wiring harness at the headliner of the vehicle. Mount **416** is preferably a breakaway mount, such as disclosed in commonly assigned U.S. Pat. No. 5,820,097, issued to Spooner, the disclosure of which is hereby incorporated herein by reference, but may be other button or channel mounts, without affecting the scope of the present invention.

Mount **416** preferably comprises a breakaway resilient retainer **416***a*, which is adapted to engage a button (not shown) secured to the windshield. Retainer **416***a* comprises a plurality of mounting flanges **416***b* for removably securing the retainer to the button, and a ball receiving socket **416***c* for pivotally receiving a ball member therein, as discussed below. Mount **416** further comprises a casing **416***d* which is mountable on retainer **416***a* to cover the retainer and provide a finished appearance to the mount **416**. Preferably the cover **416***d* comprises a molded polymeric, plastic material, which may further include a channel **416***e* for a mirror wiring (not shown) to be routed and secured therethrough.

Mounting arm **414** is preferably a double ball arm, which comprises a central shaft portion **414***a* and opposite ball members **414***b* and **414***c*. Ball members **414***b* and **414***c* are attached to respective neck portions **414***d* and **414***e* at opposite ends of shaft portion **414***a*. A first ball member **414***b* is pivotally connectable to ball receiving socket **416***c* of mount **416**, while the second ball member **414***c* is pivotally secured within a ball receiving socket of the interior rearview mirror (not shown). A socket such as that shown in embodiment **310** would be suitable. Mounting arm **414** further comprises a cover member **415**, which substantially encases shaft portion **414***a* of arm **414**. Preferably, as shown in FIG. **10**, cover member **415** is slotted along its entire length to facilitate expansion of the slot or opening **415***e* for insertion of shaft **414***a* therewithin. Cover member **415** is biased to return to its closed position to secure shaft **414***a* within cover member **415**. Cover member **415** preferably comprises a plastic material, such as polypropylene, EPDM, or the like, and is preferably moldable in a desired color to match the interior rearview mirror or interior color scheme or trim of the vehicle. As shown in FIG. **10**, cover member **415** has a generally circular cross-section, which defines a generally circular passageway **415***a* extending therealong. A channel or groove **415***b* is also provided along passageway **415***a* to provide a passageway for the mirror wiring harness between the wiring channel **416***e* of mount **416** and the interior rearview mirror.

It is further envisioned that cover member **415** may further comprise a recess **415***c* and a slotted cover plate **416***d* which covers or encloses recess **415***c*. Recess **415***c* may contain scented inserts or the like, for providing an air freshener in the vehicle, which would not be visible to an occupant of the vehicle. Additionally, recess **415***c* may be positioned substantially adjacent to wiring groove or channel **415***b*, such that the scented inserts may be of the type whereby performance is enhanced through heating, with the heat being provided by the resistance in the wiring when one or more of accessories associated with mounting arm **414** is in use.

Referring now to FIG. **11**, an alternate embodiment of the invention comprises a mounting base **516**, a mounting arm **514** and an accessory such as an interior rearview mirror **510**. The interior rearview mirror may comprise one or more electronic accessories, such that a mirror wiring **511** is connectable between interior rearview mirror **510** and a vehicle wiring harness or wiring (not shown). Mount **516** is mountable to an interior surface of the windshield and comprises a mounting button or the like **516***a* and a ball receiving mounting retainer **516***b*, which is mountable to button **516***a* to secure mount **516** to the windshield or the like. Retainer **516***b* preferably comprises a ball receiving socket **516***c* for receiving a ball member, as discussed below. Preferably, a wiring passageway **516***d* is provided in retainer **516***b* to facilitate routing of the mirror wiring through the retainer and into ball receiving socket **516***c*. Preferably, retainer **516***b* further comprises a cover to provide a finished appearance to the mount **516**. The cover preferably comprises a plastic material, which may be molded in color to match the color of the trim or accessories of the vehicle.

Mounting arm **514** is preferably a double ball mounting arm, which comprises a central shaft portion **514***a* and a ball member **514***b* and **514***c* positioned at opposite ends of the shaft portion **514***a*. A passageway **514***d* is provided through mounting arm **514**, preferably through a center portion of ball members **514***b* and **514***c* and shaft portion **514***a*, for receiving and routing the mirror wiring **511** from passageway **516***d* of mount **516** to a corresponding passageway **510***a* of interior rearview mirror **510**. Mirror assembly **510** comprises a ball receiving socket **510***b* for receiving ball member **514***c* of arm **514** and a wiring passageway **510***b* for receiving the mirror wiring from passageway **514***d* and arm **514**. Ball receiving socket **516***c* of mount **516** likewise receives ball member **514***b* of arm **514**, such that the wiring which is routed through passageway **516***d* in mount **516** is

further routed through passageway 514*d* of arm 514 and into passageway 510*b* of interior rearview mirror 510. Preferably, passageway 514*d* is flared outwardly at either end to facilitate movement of the mirror wiring as one or both ball members are pivoted within their respective sockets, thereby substantially reducing the possibility of cutting or damaging the wiring as the mirror and/or arm 514 are pivoted relative to the mount 516.

Changes and modifications in the specifically described embodiments can be carried out without departing from the principles of the invention, which is intended to be limited only by the scope of the appended claims, as interpreted according to the principles of patent law.

The embodiments of the invention in which an exclusive property right or privilege is claimed are defined as follows:

1. An interior rearview mirror system comprising:

a vehicle having an interior portion;

a mounting base adapted for mounting to said interior portion of said vehicle;

said interior portion of said vehicle comprising at least one of (a) a windshield portion, said windshield portion including a mirror mounting button, and (b) a header portion, said mounting base including a first ball member extending therefrom;

an interior rearview mirror body comprising a reflective element and a casing, said reflective element providing a rearward view of said vehicle when said vehicle is operated; and

a mounting arm pivotally securing said interior rearview mirror body to said mounting base, said mounting arm comprising a biasing member and a ball receiver, said ball receiver comprising a ball receiving portion for pivotally receiving said first ball member therein and a biasing member receiving portion for at least partially receiving said biasing member therein, said biasing member receiving portion being opposite said ball receiving portion, said biasing member receiving portion having an inner portion and an outer circumferential portion, said inner portion comprising a substantially continuous planar surface radially inwardly of said outer circumferential portion, said biasing member engaging said generally planar surface of said inner portion, said outer circumferential portion of said biasing member receiving portion comprising a circumferential guide wall extending longitudinally from and circumferentially around said generally planar surface, said circumferential guide wall being configured to maintain alignment of said biasing member with said ball receiver, said mounting arm further including a sleeve which at least partially encases said ball receiver and said biasing member.

2. The interior rearview mirror system of claim 1, wherein said ball receiver pivotally receives said ball member of said mounting base.

3. The interior rearview mirror system of claim 2, wherein said biasing member engages said biasing member receiving portion and biases said ball receiver toward said ball member to pivotally secure said ball member to said ball receiver.

4. The interior rearview mirror system of claim 3, wherein said circumferential guide wall extends within said sleeve at least partially along said biasing, member to align said biasing member within said sleeve.

5. The interior rearview mirror system of claim 4, wherein said circumferential guide wall comprises an annular ring.

6. The interior rearview mirror system of claim 5, wherein said substantially continuous planar surface is disposed at a base of said annular ring.

7. The interior rearview mirror system of claim 4, wherein said sleeve narrows at least one end, said at least one end corresponding to said ball receiver, said narrow end being operable to clamp said ball receiver about said ball member of said mounting base in response to said biasing member biasing said ball receiver toward said narrow end of said sleeve.

8. The interior rearview mirror system of claim 1, wherein said circumferential guide wall comprises an annular ring.

9. The interior rearview mirror system of claim 8, wherein said substantially continuous planar surface is disposed at a base of said annular ring.

10. The interior rearview mirror system of claim 1, wherein said mounting base is secured to said interior surface of said windshield of said vehicle.

11. The interior rearview mirror system of claim 10, wherein said mounting base is removably secured to said mirror mounting button attached to said interior surface of said windshield portion of said vehicle.

12. The interior rearview mirror system of claim 1, wherein said mounting base is secured to said header portion of said vehicle.

13. The interior rearview mirror system of claim 1, wherein said reflective element comprises an electrochromic reflective element.

14. The interior rearview mirror system of claim 1, wherein said biasing member comprises a coil spring.

15. The interior rearview mirror system of claim 1, wherein said interior rearview mirror body has a weight equal to at least approximately 300 grams.

16. The interior rearview mirror system of claim 1, wherein said mounting arm is pivotally secured to both said mounting base and said interior rearview mirror body.

17. The interior rearview mirror system of claim 16, wherein said mounting arm further comprises a second ball member at an end opposite said ball receiver, said second ball member being pivotally received by said casing of said interior rearview mirror body.

18. The interior rearview mirror system of claim 17, wherein said second ball member comprises a second biasing member receiving portion having a second inner portion and a second outer circumferential portion for maintaining alignment of said biasing member, said biasing member engaging said second inner portion.

19. The interior rearview mirror system of claim 18, wherein said second ball member is secured by an end of said sleeve having a narrowed opening.

20. The interior rearview mirror system of claim 19, wherein said second ball member is further secured by at least one dimple in said sleeve.

21. The interior rearview mirror system of claim 18, wherein said reflective element comprises a prismatic reflective element.

22. The interior rearview mirror system of claim 1, wherein said interior rearview mirror body has a weight equal to at least approximately 500 grams.

23. An interior rearview minor system comprising:

a vehicle having an interior portion;

a mounting base adapted for mounting to said interior portion of said vehicle;

said interior portion of said vehicle comprising at least one of (a) a windshield portion, said windshield portion including a mirror mounting button, and (b) a header portion, said mounting base comprising a first ball member extending therefrom;

an interior rearview mirror body comprising a casing and a reflective element, said reflective element providing a

rearward view of said vehicle when said vehicle is being operated;

a mounting arm pivotally securing said interior rearview mirror body to said mounting base, said mounting arm comprising a first ball receiver at a first end for pivotally securing to said first ball member, a second ball member at a second end pivotally securing to said interior rearview mirror body, and a biasing member positioned between said first ball receiver and said second ball member, said first end being generally opposite said second end, said first ball receiver having a first ball receiving portion and a first biasing member receiving portion, said first biasing member receiving portion having a first inner portion and a first outer circumferential portion, said second ball member including a second biasing member receiving portion, said second biasing member receiving portion having a second inner portion and a second outer circumferential portion, said mounting arm further including a sleeve which at least partially encases said first ball receiver, said biasing member and said second ball member; and

wherein each end of opposite ends of said biasing member engages a respective one of said first and second inner portions, said first and second inner portions defining respective substantially continuous planar surfaces radially inwardly of said first and second outer circumferential portions, each of said first and second outer circumferential portions comprising a guide wall extending longitudinally from and circumferentially around a respective one of said first and second inner portions, said each end of said opposite ends of said biasing member being within said sleeve and engaged with a respective one of said first and second inner portions and aligned between said first ball receiver and said second ball member by a respective one of said guide walls of sad first and second biasing member receiving portions engaging at least a portion of an outer surface of said each end of said opposite ends of said biasing member.

24. The interior rearview mirror system of claim 23, wherein said guide wall of said first and second biasing member receiving portions comprise annular guide rings.

25. The interior rearview mirror system of claim 24, wherein said first and second substantially continuous planar surfaces is disposed at a base of a respective one of said annular guide rings.

26. The interior rearview mirror system of claim 23, wherein said reflective element comprises an electrochromic reflective element.

27. The interior rearview mirror system of claim 23, wherein said reflective element comprises a prismatic reflective element.

28. The interior rearview mirror system of claim 23, wherein said first ball receiver comprises an elastomeric material.

29. The interior rearview mirror system of claim 28, wherein said first ball member and said second ball member comprise aluminum.

30. The interior rearview mirror system of claim 23, wherein said biasing member comprises a coil spring.

31. The interior rearview mirror system of claim 23, wherein said interior rearview mirror body has a weight equal to at least approximately 300 grams.

32. The interior rearview mirror system of claim 23, wherein said interior rearview mirror body has a weight equal to at least approximately 500 grams.

33. The interior rearview mirror system of claim 23, wherein said mounting base is adapted to be mounted to said interior surface of said windshield of said vehicle.

34. The interior rearview mirror system of claim 23, wherein said mounting base is adapted to be mounted to said header portion of said vehicle.

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U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

APR 14 2005

Mr. Xiaoda Xiao
President & CEO
ZX, Invention
135 Belchertown Road
Amherst, MA 01002

Dear Mr. Xiao:

This responds to your letter seeking an evaluation of your product (the Vector Blind Spot Mirror enclosed with your letter), in order to determine whether the mirror, when properly installed, blocks the front windshield or shakes during driving. Because, we do not conduct certification testing or offer product endorsements, we are unable to provide such an evaluation. The following discussion briefly explains how our Federal motor vehicle safety standards (FMVSSs) operate and how they may pertain to your product.

By way of background information, the National Highway Traffic Safety Administration (NHTSA) is authorized to issue FMVSSs that set performance requirements for new motor vehicles and items of motor vehicle equipment. NHTSA does not provide approvals of motor vehicles or motor vehicle equipment. Instead, it is the responsibility of manufacturers to certify that their products conform to all applicable safety standards (see 49 CFR Part 571) before they can be offered for sale. NHTSA enforces compliance with the standards by purchasing and testing vehicles and equipment, and we also investigate safety-related defects.

As you are probably aware, FMVSS No. 111, Rearview Mirrors, sets forth requirements for mirrors on new passenger cars, multipurpose passenger vehicles, trucks, buses, school buses, and motorcycles in order to provide a clear and reasonably unobstructed view to the rear (49 CFR 571.111). New vehicles must be certified as complying with the requirements of FMVSS No. 111, as well as all other applicable standards.

However, the packaging and descriptions of your product suggest that it would not be installed on the vehicle as original equipment, but instead, it would be sold as aftermarket equipment. Accordingly, we believe that your product would be a supplemental mirror that is not covered by FMVSS No. 111, so you would not have any corresponding certification responsibilities under our standards.